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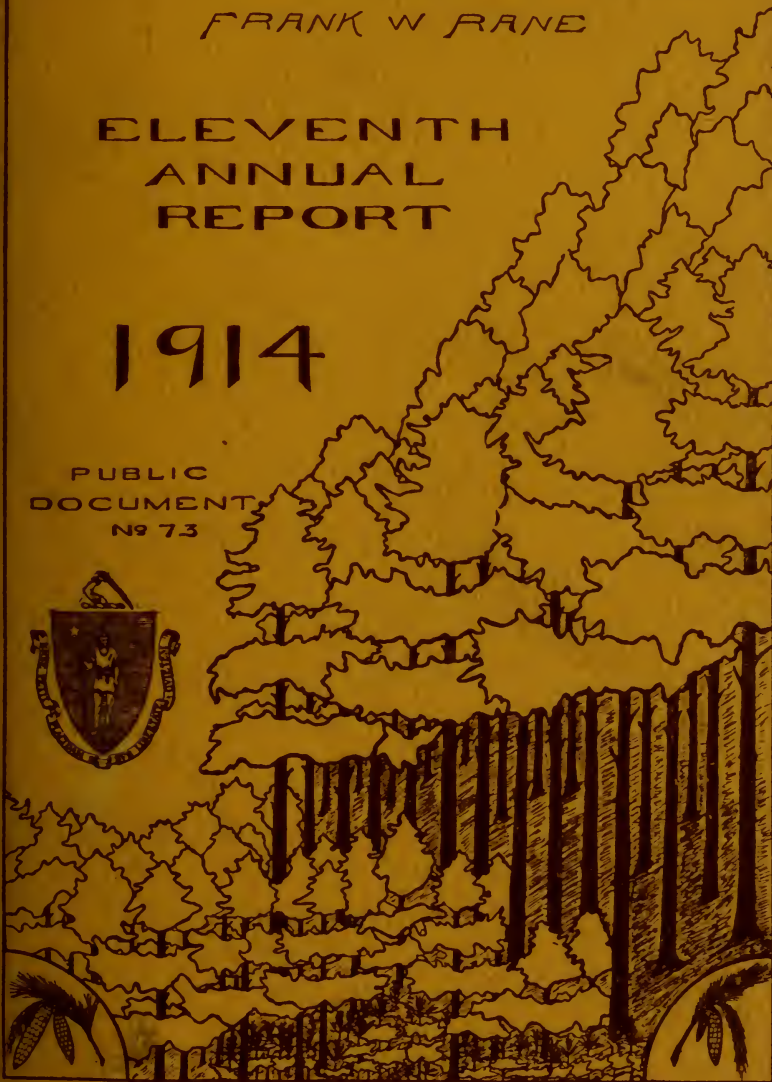
THE MASSACHUSETTS STATE FORESTER

FRANK W RANE

ELEVENTH
ANNUAL
REPORT

1914

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No 73



THE STATE FORESTER

OF

MASSACHUSETTS.

ELEVENTH ANNUAL REPORT,

1914.

F. W. RANE, STATE FORESTER.



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The Commonwealth of Massachusetts.

To the General Court.

The work of the State Forester is herewith reported upon for the past year in accordance with the provisions of chapter 409, section 5, Acts of 1904.

It is with pleasure that I can say that the year has been an extremely busy and successful one, and that the co-operation, not only of the General Court but of our people generally, has been most cordial and of a constructive nature.

Respectfully submitted,

F. W. RANE,
State Forester.

Dec. 31, 1914.

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The forest fire observation tower at Hanson. This tower was constructed through the co-operation of the surrounding towns with the State Forester.

The Commonwealth of Massachusetts.

ELEVENTH ANNUAL REPORT OF THE STATE FORESTER.

INTRODUCTION.

The granting by the General Court at its last session of an appropriation of \$90,000 for the purchase of State forests, the enactment of both the forest taxation law and regulations for the disposal of slash bordering forestry operations, together with an increased forest fire appropriation, were in themselves sufficient to give encouragement to any State forester.

The season of 1914 to our mind eclipsed all previous ones in undertakings and accomplishments. It is therefore with a great deal of pride and no little pleasure that your State Forester presents this, his annual report, outlining in a general way the activities of this department for the past year. He fully realizes that for whatever progress has been made the credit belongs to no one person, but to the splendid co-operation on the part of the people generally.

"Conservation" has come to be the term that stands for accomplishing something in the economic utilization of our natural resources throughout the nation, and it is an ungrateful citizenship that will not respond to aiding this great and important cause. Our Massachusetts people have awakened to not only talk and advocate conservation, but have gone even farther and enlisted in a campaign of restoration and utilization as well as "conservation." Our State being one of the oldest, and abounding in excellent markets, the forest products have been heavily drawn upon, and hence our forest lands have been rapidly depleted. Now that other and further sources of supply have met with similar experience, the time has come when we must determine our future source of forest products. Upon

turning to a study of forest culture and management we find here in Massachusetts a fertile field for great accomplishments.

During each successive year, of late, we have been the more able to do work that begins to show definite results. Our splendid forest fire protective system in Massachusetts is certainly something of which we may all be proud. Where forest fires a few years ago were allowed to run at will, to-day we aim to detect and extinguish them at once. Our system consists of 26 observation towers scattered over the State, each containing a wide-awake observer, who has telephone connection with forest wardens in each city and town, 353 in all. In addition we have 1,500 deputies, a State Fire Warden with his four assistants, who patrol each section of the State in auto runabouts, and also 300 rural mail carriers whose duty it is to report fires. With this comprehensive system it can be plainly seen that the danger of the destruction of forests by fire is rapidly being overcome.

Next from point of importance to forest fires comes, probably, forest taxation. The past season realized the placing of a rational and workable forest tax law on our statute books. By registering forest land in accordance with the new law any one may have a comprehensive and definite knowledge of what his future forest taxes will be. This law is automatic, and is a safety valve for rational forestry investment. It took six years to secure this forest taxation law, as it necessitated a change in the State Constitution and an acceptance by the people, even before a commission could be appointed to draft and submit the new law to the Legislature.

The new *slash law*, which takes effect Jan. 1, 1915, requires that all lumbermen, farmers or others who operate wood lots hereafter must remove or destroy all brush or slash for a distance of 40 feet from the highway, railroad or abutting woodland. This law will render conditions far more favorable for handling incipient forest fires. The strip will act as a natural forest fire line.

With the above regulations added to our numerous previous acts, such as the permit act, the forest warden act, the reforestation act, the forest domain act, the town forest fire equipment act, etc., we now have a set of fundamental laws

which we may proudly acclaim in their entirety, and which make up what the State Forester chooses to designate as the Massachusetts forest policy. For a fuller discussion in detail the reader is referred to a paper entitled "The Massachusetts Forest Policy," which the State Forester read before the Society for the Promotion of Agricultural Science, at Washington, D. C., on Nov. 11, 1914, and which is reprinted elsewhere in this report.

It has taken eleven years since the creating of the office of State Forester, therefore, to arrive at our present well-rounded-out forestry system. It now behooves us to build up a splendid State forest structure upon this foundation. The energies of the State Forester henceforth will be to explain, simplify and put into practical operation forestry practices of all sorts, and he asks the whole-hearted co-operation of all Massachusetts citizens to that end.

While it has been necessary for the State Forester to go to the Legislature each year for many new laws and special appropriations, it is believed that our future forestry bills will be more spontaneous and come from our people themselves. We have at the present time not only cordial co-operation and interest on the part of the lawmakers themselves, but much interest is shown in the State, city and local organizations of every kind. Examples of these are the Patrons of Husbandry or State Grange; State Board of Agriculture; Federation of Women's Clubs; boards of trade; sportsmen's organizations, etc.

The one organization in particular which has, from its natural affiliations and close association with the State Forester, been of great assistance is the Massachusetts Forestry Association. This organization introduced the bill creating this office, and the development of forestry interest throughout Massachusetts can be gauged by the great increase in membership of this association alone. A few years ago a membership of 800 was pointed to with pride, while the past year its membership totaled 3,200. This organization is not only interested in modern forestry development, as, for example, in offering a prize for a competition in municipal forest planting of 50,000 young trees to the winner this next spring, but the association

is also deeply interested in roadside trees and shade trees of all kinds. Last spring a great deal of interest was aroused in a competition by various cities and towns over roadside tree planting, and the winning town was given the trees and the expense of planting two miles of roadsides. It is needless to point out that this work popularizes forestry and educates our citizens, and particularly the coming generation, to appreciate trees and forestry.

Under the head of "Forest Management," which is treated more in detail in this report, the department has made 58 examinations which cover a total area of 13,255 acres. Working plans, making forest fire lines and mapping work have also come under this head.

The department has again increased its nursery work by establishing a new nursery at Barnstable, Mass., which will be used largely for growing seedlings. This nursery, in conjunction with our old one at Amherst, will supply us with sufficient stock to meet our increased demands. The new seed beds at the Barnstable nursery contain as fine a stand of seedlings as the writer has ever seen. A transplant nursery has been started on the grounds of the State Farm at Bridgewater, and it is our purpose to greatly enlarge this acreage in the spring. A large amount of nursery stock was given to various State institutions for planting upon their holdings the past year.

The practice of aiding towns and cities from the State appropriation, in getting better and more permanent equipment for use in work against the gypsy and the brown-tail moths, has been followed throughout the past season, with the result that they are in a position to do far more effective work in the future, and at less expense. Where this office is getting proper co-operation from cities and towns (and this is quite general) the moth work is constantly improving.

Now that the United States Department of Agriculture has for the past two years assumed the work of checking the spread of the gypsy moth, and also taken over the parasite work, our State work has become more specific and definite. Each year a number of towns and cities that have been having State aid are added to the list of those self-supporting. Such cities and towns, now that they have had assistance and are in a position to

handle their work within their liability, should be compelled hereafter to keep it up to this standard of efficiency. The State appropriation for the coming year is needed in aiding those towns that in the past have had scattering infestations which now have become very general. As long as there are but a few insects little co-operation is forthcoming, but when the stripping stage is reached then people begin to realize the danger.

During the past year, at a request from the United States Department of Agriculture, a number of towns situated just within the so-called border towns now being handled by that department were scouted and given special consideration. As the government is faithfully attempting, at great expense, to check the spread into new territory, it was thought a wise expenditure of State funds to thus co-operate. During the coming year the central and north cape country will need a great deal of attention.

The forest-thinning method of handling the moths, whereby the trees preferred by them are removed, and resistant species retained, and even planted, has proved, with spraying, a great success. Many woodland owners are taking advantage of this practice, and we predict that as rapidly as markets can be worked up for the products removed this work will just as rapidly increase. This work has not only the advantage of permanency, but it brings about a more economic forestry condition for the future. The subject is discussed more fully elsewhere in this report.

Briefly, therefore, the moth suppression work is being handled with a definiteness of purpose, and that real gains are being made there is no doubt. The work should be continued along our present lines, taking advantage of every method or combination of methods that will get results economically.

This report itself contains much else in detail about forestry in general, and our moth work, and by this introduction it is hoped the reader may be interested to look more deeply into our various activities.

ORGANIZATION.

During the year there have been a few changes, but generally speaking the personnel of the staff has remained the same.

Mr. R. S. Langdell, who has been an assistant in charge of

reforestation work for seven years, resigned last spring to engage in commercial forestry work. He has become one of the firm of the Franklin Forestry Company, and has charge of their reforestation work. Mr. Langdell was first employed to take charge of the nursery work, and to him is due the credit for the splendid success that we have had in growing seedlings and transplants for our State work. It was with reluctance that we accepted his resignation. Mr. Langdell's work has been for the time being placed under the supervision of Mr. H. O. Cook, while Mr. J. R. Simmons, a young man who was employed as a college forestry student from Syracuse University during the summer of 1912 on forest mapping, was hired to have charge of the nursery work.

Mr. Roy G. Pierce, M.F., who became a member of the staff as assistant in charge of chestnut blight work, in co-operation with the United States Department of Agriculture, and had been with us for over a year, finished his duties with us at the completion of the term of agreement, July 1, and returned to Washington, D. C. Mr. Pierce proved an enthusiastic worker, and did very much to acquaint our people with the chestnut disease and methods of handling it.

Mr. Ray Weston, M.F., was employed during the year to assist Mr. Kneeland in the forest thinning work for controlling moth suppression.

The remainder of the organization is practically the same as last year, with slight alterations.

The organization follows: —

GENERAL STAFF.

F. W. RANE, B.Agt., M.Sc.,	. State Forester.
C. O. BAILEY, . . .	. Secretary.
ELIZABETH HUBBARD, .	. Bookkeeper.
JOSEPH A. L. GALLAGHER, .	. Clerk.
ELIZABETH T. HARRAGHY,	. Stenographer.
JENNIE D. KENYON, .	. Stenographer.
JAMES H. CROWLEY, .	. Office boy.

GENERAL FORESTRY.

F. W. RANE, B. Agr., M.Sc.,	. State Forester.
H. O. COOK, M.F., . . .	. Assistant Forester.
F. L. HAYNES, B.F., . .	. Forest examiner.
J. R. SIMMONS, B.Sc., .	. Reforestation work.
HAROLD FAX, M.F., . .	. Forest mapping.

EBEN SMITH,	Superintendent, Barnstable Nursery.
DEAN TOWNSLEY,	Superintendent, Amherst Nursery.
J. L. PEABODY,	Field foreman.
JAMES MORRIS,	Field foreman.
H. N. BUTLER,	Field foreman.
H. G. TAVENER,	Field foreman.
H. H. CHASE,	Field foreman.

STAFF, MOTH WORK.

F. W. RANE, B.Agr., M.Sc.	State Forester.
GEO. A. SMITH,	Assistant (equipment, accounts, etc.).
PAUL D. KNEELAND, M.F.,	Assistant (woodlands, products, etc.).
JOHN MURDOCH, JR., A.M.,	Assistant.
RAY F. WESTON, M.F.,	Assistant.
FRANCIS V. LEAROYD,	Clerk.

DISTRICT MOTH MEN.

1. JOHN W. ENWRIGHT, Medford.	5. HARRY B. RAMSEY, Worcester.
2. SAUL PHILLIPS, Beverly.	6. C. W. PARKHURST, Medfield.
3. JOHN J. FITZGERALD, Haverhill.	7. W. F. HOLMES, East Braintree.
4. WM. A. HATCH, Marlborough.	8. J. A. FARLEY, Plymouth.

STAFF, FOREST FIRE PREVENTION.

F. W. RANE, B.Agr., M.Sc.,	State Forester.
M. C. HUTCHINS,	State Fire Warden.
MINER E. FENN,	Assistant.
JAMES E. MOLOY,	Locomotive inspector.

DISTRICT FOREST WARDENS.

1. OSCAR L. NOYES, Byfield.	3. JOHN P. CROWE, Westborough.
2. J. J. SHEPHERD, Pembroke.	4. ALBERT R. ORDWAY, Westfield.

OBSERVERS.

District 1.

WM. BRAY, Georgetown.
 GEO. G. CALVERT, Sharon.
 J. FRANK HAMMOND, Chelmsford.
 ELIOT C. HARRINGTON, Milton.
 CAPLIS McCORMICK, Essex.
 JOHN H. O'DONNELL, Wakefield.

District 3.

A. M. BENNETT, Pelham.
 JOHN GIBLIN, Westborough.
 J. H. LOMBARD, Warwick.
 JAMES MALEY, Princeton.
 GEO. W. SHERMAN, Brimfield.

District 2.

CALVIN BENSON, Barnstable.
 WALTER H. BLAKE, Dighton.
 FRANK L. BUCKINGHAM, Plymouth.
 ALVARO HARDEN, Fall River.
 S. MATTHEWS, Middleborough.
 CALVIN C. PARKER, North Harwich.
 W. F. RAYMOND, Bourne.
 CUSHING O. THOMAS, South Hanson.
 W. I. MOODY, Falmouth.

District 4.

C. M. BROWN, Ashfield.
 H. H. FITZROY, Savoy.
 CHAS. F. KIMBALL, Becket.
 GEO. C. MILLER, Easthampton.
 NELSON C. WOODWARD, Shelburne.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.

[Alphabetically by towns and cities.]

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
57-W, Rockland, .	Arthur B. Reed, . . .	Abington, . . .	C. F. Shaw, . . .	7
10-4,	W. H. Kingsley, . . .	Acton,	J. O'Neil,	4
2003-M, . . .	Henry F. Taber, . . .	Acushnet, . . .	A. P. R. Gilmore, .	8
2-0, Kippers, .	John Clancy,	Adams,	John Clancy, . . .	5
1431-M, . . .	E. M. Hitchcock, . . .	Agawam,	- - -	-
151-32, Great Bar- rington. 274-M,	J. H. Wilcox, State Line, James E. Feltham, . . .	Alford,	- - -	-
174-Y,	A. F. Bardwell, . . .	Amherst,	A. L. Stover, . . .	3
212,	John H. Baker,	Amherst,	W. H. Smith, . . .	5
35 or 206, . . .	John H. Baker,	Andover,	J. H. Playdon, . . .	3
2-12,	Walter H. Pierce, . . .	Arlington, . . .	Daniel M. Daley, . .	1
24-2,	J. T. Withington, . . .	Ashburnham, . . .	Chas. H. Pratt, . . .	4
4-12,	Wm. S. Green,	Ashby,	Fred C. Allen, . . .	4
479-W,	Chas. A. Hall,	Ashfield,	- - -	-
48-J or 72-4, .	Horace H. Piper, . . .	Ashland,	Theodore P. Hall, . .	6
34-4,	Frank P. Hall,	Athol,	W. S. Penniman, . .	5
5-17,	Hiram R. Packard, . . .	Attleborough, . . .	W. E. S. Smith, . . .	6
3259-M,	J. F. Searle,	Auburn,	J. F. Searle,	5
96-4 or 47-4, .	J. W. McCarty,	Avon,	W. W. Beals,	7
144-2,	Chas. E. Perrin,	Ayer,	D. C. Smith,	4
83-4,	Henry C. Bacon, Hyannis,	Barnstable,	F. W. Chase,	8
18 or 8000, . .	A. E. Traver,	Barre,	G. R. Simonds, . . .	5
117-1 Lex., . .	P. B. McCormick,	Becket,	- - -	-
10-2,	Chas. E. Williams, . . .	Bedford,	W. A. Cutler,	1
8157-22, Milford, .	Jas. A. Peeso,	Belchertown, . . .	E. C. Howard,	5
409-W,	L. Francis Thayer, . . .	Bellingham,	H. A. Whitney, . . .	6
1367-M,	John F. Leonard,	Belmont,	C. H. Houlahan, . . .	1
14-6,	G. H. Babbitt, Taunton, R. F. D. Walter Cole,	Berkley,	A. A. Briggs,	6
2-13,	Edson W. Hale,	Berlin,	E. C. Ross,	4
319-J,	Robert H. Grant,	Bernardston, . . .	Edwin B. Hale, . . .	5
22-2,	Thomas Reilly,	Beverly,	J. B. Brown,	2
875-L-1, Woon- socket. 12-2,	E. N. Bartlett,	Billerica,	W. H. O'Brien, . . .	1
9-14,	I. E. Whitney,	Blackstone,	A. J. Gibbons, . . .	5
- - -	E. Eliot Hurlbut, . . .	Blandford,	- - -	-
103-13,	- - -	Bolton,	C. E. Mace,	4
	Emory A. Ellis, Bourne- dale.	Boston,	Park and Recrea- tion Department. Edward D. Nick- erson.	1
		Bourne,		8

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
No telephone,	H. J. Livermore,	Boxborough,	C. E. Sherry,	4
42-21, George-	Harry L. Cole, George-	Boxford,	C. Perley,	3
town.	town, R. F. D.	Boylston,	R. B. Smith,	5
4-4,	John N. Flagg,	Braintree,	Clarence R. Bes-	7
433-R,	Jas. M. Cutting, South	Brewster,	tick.	8
No telephone,	Braintree.	Edwin S. Rhoades,	Russell D. Eaton,	7
8-6,	T. B. Tubman,	Bridgewater,	F. C. Worthen,	5
14-3,	Geo. E. Hitchcock,	Brimfield,	G. E. Hitchcock,	7
1041 or 2020,	Harry L. Marston,	Brockton,	Geo. C. Kane,	5
101-13,	Elbert L. Bemis,	Brookfield,	J. H. Conant,	1
376,	Geo. H. Johnson,	Brookline,	Ernest B. Dane,	-
52-8,	Gilbert E. Griswold,	Buckland,	-	1
No telephone,	W. W. Skelton,	Burlington,	W. W. Skelton,	7
51-4,	Robert C. Hughes,	Canton,	A. Hemenway,	1
-	-	Cambridge,	J. F. Donnelly,	1
76-5, Concord,	Geo. G. Wilkins,	Carlisle,	G. G. Wilkins,	8
16-2,	Herbert F. Atwood,	Carver,	H. F. Atwood,	-
14-12,	Albert L. Veber,	Charlemont,	-	5
32-22,	Chas. S. McKinstry,	Charlton,	J. D. Fellows,	8
28-3,	Geo. W. Ryder, West	Chatham,	Mervyn R. Martin,	1
1597-R, Lowell,	Chatham.	Chelmsford,	M. A. Bean,	1
-	Arnold C. Perham,	Chelsea,	J. A. O'Brien,	-
-	-	Cheshire,	-	-
167-3,	Chas. D. Cummings,	Chester,	-	-
7-4,	Wm. E. Major,	Chesterfield,	-	-
4,	Chas. A. Bisbee, Bisbees,	Chicopee,	Z. Pilland,	8
149-M or 149-W,	John E. Pomphret,	Chilmark,	A. S. Tilton,	5
216-14,	Ernest C. Mayhew,	Clarksburg,	Geo. Tisdale,	4
No telephone,	Danforth Blanchard,	Clinton,	John B. Connery,	7
551-M,	North Adams, R. F. D.	Cohasset,	Wm. H. McArthur,	5
177-3 or 260,	Patrick H. Kelley,	Colrain,	Edgar F. Copeland,	4
13-9,	Wm. J. Brennock,	Concord,	H. P. Richardson,	-
75-3,	E. H. Temple, Shattuck-	Conway,	-	-
5-3,	ville.	Cummington,	-	-
8001,	Frank W. Holden,	Dalton,	-	-
42-12,	Edgar Jones,	Dana,	T. L. Thayer,	2
No telephone,	Thos. A. Gabb,	Danvers,	T. E. Tinsley,	8
295-W,	Dana.	Dartmouth,	E. M. Munson,	-
14-3, Westport,	Michael H. Barry,			
	Ezekiel W. Reed, North			
	Dartmouth.			

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
35-R, . . .	H. J. Harrigan, . . .	Dedham, . . .	J. T. Kennedy, . . .	7
273-14, Greenfield,	Wm. L. Harris, . . .	Deerfield, . . .	Wm. L. Harris, . . .	5
No telephone, . .	Chas. E. Pierce, South Dennis.	Dennis, . . .	H. H. Sears, . . .	8
29-3,	Ralph Earle,	Dighton,	D. F. Lane,	6
11-4,	Wm. L. Church,	Douglas,	F. J. Libby,	5
372-3,	John Breagy,	Dover,	H. L. MacKenzie, . .	6
3353-2,	Frank H. Gunther, . . .	Dracut,	T. F. Carrick, . . .	1
152-2, Webster, . .	F. A. Putnam,	Dudley,	Frank W. Bate- man.	5
5-11, Tyngsbor- ough.	Archie W. Swallow, . .	Dunstable,	W. H. Savill,	4
4-2, Duxbury, . .	Henry A. Fish, South Duxbury.	Duxbury,	H. A. Fish,	7
146-5,	Richard H. Copeland, Box 115, Elmwood.	E. Bridgewater, . .	Frank H. Taylor, . .	7
8-5,	Asher Markham,	E. Longmeadow, . .	-	-
24-3,	Adin L. Gill,	Eastham,	N. P. Clark,	8
2-11,	J. M. Dineen,	Easthampton, . . .	-	-
76,	Frederick Hanlon, North Easton.	Easton,	R. W. Melendy, . . .	6
241-2,	Manuel S. Swartz, . . .	Edgartown,	John P. Fuller, . . .	8
165-25,	Frank W. Bradford, Great Barrington.	Egremont,	-	-
17-11,	Herbert A. Coolbeth, . .	Enfield,	H. C. Moore,	5
No telephone, . .	Chas. H. Holmes, Far- ley.	Erving,	Chas. H. Holmes, . .	5
23-5,	Otis O. Story,	Essex,	O. O. Story,	2
-	-	Everett,	P. O. Sefton,	1
1686-Y,	Chas. F. Benson,	Fairhaven,	G. W. King,	8
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, . . .	8
136-2,	H. H. Lawrence, Tea- ticket.	Falmouth,	W. B. Bosworth, . .	8
745,	P. S. Bunker,	Fitchburg,	Page S. Bunker, . . .	4
Hoosac Tunnel pay station.	H. B. Brown, Drury, . .	Florida,	-	-
15-5 or 76-3, . .	Ernest A. White,	Foxborough,	F. S. Richardson, . .	6
352-4, South Fram- ingham.	B. P. Winch,	Framingham,	N. I. Bowditch, . . .	6
66-12,	Edward S. Cook,	Franklin,	J. W. Stobbart, . . .	6
3-12,	Andrew Hathaway, As- sonet.	Freetown,	G. M. Nichols,	8
191-M,	Geo. S. Hodgman,	Gardner,	T. W. Danforth, . . .	5
-	Leander B. Smalley, Me- nemsha.	Gay Head,	J. W. Belain,	8
31-4,	Clinton J. Eaton,	Georgetown,	C. J. Eaton,	3
4-15, Bernardston,	Lewis C. Munn, Turners Falls.	Gill,	R. E. White,	5
547-5,	Sydney F. Haskell, . . .	Gloucester,	H. J. Worth,	2
18-4,	John S. Mollison, Wil- liamsburg.	Goshen,	-	-
No telephone, . .	Rodney E. Bennett, . . .	Gosnold,	-	-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
- -	W. A. Getchell, North Grafton.	Grafton, . . .	C. K. Despeau, . .	5
3-13, . . .	C. N. Rust, . . .	Granby, . . .	Chas. N. Rust, . .	5
3-3, . . .	Harry A. Root, . . .	Granville, . . .	- -	-
327-W, . . .	Daniel W. Flynn, . . .	Gt. Barrington, . . .	T. J. Kearin, . . .	5
439-M, . . .	J. W. Bragg, . . .	Greenfield, . . .	J. W. Bragg, . . .	5
33-24, Enfield, . .	Wm. H. Walker, Green- wich Village.	Greenwich, . . .	E. A. Sawtelle, . .	5
71-5, . . .	Chas. M. Raddin, . . .	Groton, . . .	J. F. Bateman, . .	4
2939-X, . . .	Sidney E. Johnson, . .	Groveland, . . .	R. B. Larive, . . .	3
651-33, . . .	Edward P. West, . . .	Hadley, . . .	Edw. P. West, . . .	5
5-2, Bryantville, .	W. L. Robertson, . . .	Halifax, . . .	F. D. Lyon, . . .	7
128-W, . . .	Fred Berry, Essex, R. F. D.	Hamilton, . . .	E. G. Brewer, . . .	2
5-14, . . .	Edward P. Lyons, . . .	Hampden, . . .	- -	-
17-F-2, . . .	Chas. F. Tucker, . . .	Hancock, . . .	- -	-
51-5, Rockland, . .	Chas. E. Damon, North Hanover.	Hanover, . . .	L. Russell, . . .	7
12-23, Bryantville, .	Geo. T. Moore, South Hanson.	Hanson, . . .	Geo. T. Moore, . .	7
2-5, . . .	Henry J. Breen, . . .	Hardwick, . . .	Geo. J. Fay, . . .	5
46-3, . . .	Benj. J. Priest, . . .	Harvard, . . .	G. C. Maynard, . .	4
8000, . . .	John Condon, . . .	Harwich, . . .	Arthur F. Cahoon, .	8
34-2 . . .	Fred T. Bardwell, North Hatfield.	Hatfield, . . .	Seth W. Kingsley, .	5
4-2 or 4-1, . . .	John B. Gordon, . . .	Haverhill, . . .	M. J. Fitzgerald, . .	3
6-7, Charlemont, .	Herbert A. Holden, . .	Hawley, . . .	- -	-
5-18, . . .	S. G. Benson, . . .	Heath, . . .	- -	-
21305, . . .	Geo. Cushing, . . .	Hingham, . . .	T. L. Murphy, . . .	7
20, . . .	Louis B. Bague, . . .	Hinsdale, . . .	- -	-
134-W, Randolph, .	Melvin L. Coulter, . .	Holbrook, . . .	Bradford Parks, . .	7
42-4, . . .	Winfred H. Stearns, Jef- ferson.	Holden, . . .	W. H. Stearns, . . .	5
5-21, Brimfield, . .	Oliver L. Howlett, South- bridge, R. F. D.	Holland, . . .	A. F. Blodgett, . .	5
1-2, . . .	W. A. Collins, . . .	Holliston, . . .	Herbert E. Jones, .	6
2295-W, . . .	C. J. Healey, . . .	Holyoke, . . .	T. A. Bray, . . .	5
112-4, . . .	Walter F. Durgin, . . .	Hopedale, . . .	W. F. Durgin, . . .	5
Central, . . .	R. I. Frail, . . .	Hopkinton, . . .	W. A. MacMillan, .	5
6-13, . . .	E. A. Young, . . .	Hubbardston, . . .	E. A. Young, . . .	5
132-M, . . .	Wm. T. Greene, . . .	Hudson, . . .	F. P. Hosmer, . . .	4
248-W, . . .	Smith F. Sturges, Aller- ton.	Hull, . . .	J. Knowles, . . .	7
4-11, . . .	John J. Kirby, . . .	Huntington, . . .	- -	-
148-W, . . .	Pindar F. Bussell, . . .	Ipswich, . . .	J. A. Morey, . . .	2
15-3, . . .	Arthur B. Holmes, . . .	Kingston, . . .	R. F. Randall, . . .	8

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
261-W, . . .	Nathan F. Washburn, . .	Lakeville, . . .	N. F. Washburn, . .	7
218-J, . . .	Arthur W. Blood, . . .	Lancaster, . . .	L. R. Griswold, . .	4
1295-24, . . .	King D. Keeler, . . .	Lanesborough, . .	Geo. H. Judivine, . .	5
362, . . .	Dennis E. Carey, . . .	Lawrence, . . .	I. B. Kelly, . . .	3
66-3, . . .	Jas. W. Bossidy, . . .	Lee, . . .	- -	-
37-5, . . .	B. H. Fogwell, . . .	Leicester, . . .	J. H. Woodhead, . .	5
135, . . .	O. R. Hutchinson, . . .	Lenox, . . .	T. Francis Mackey, . .	5
546 or 28, . . .	Fred A. Russell, . . .	Leominster, . . .	D. E. Bassett, . .	4
9-44, Cooleyville, . . .	O. C. Marvel, North Lev- erett.	Leverett, . . .	H. W. Field, . . .	5
480, . . .	Robert Watt, . . .	Lexington, . . .	A. P. Howe, . . .	1
289-11, Greenfield, . . .	Jacob Sauter, . . .	Leyden, . . .	Wm. A. Campbell, . .	5
44-W, . . .	J. J. Kelliher, . . .	Lincoln, . . .	J. J. Kelliher, . .	4
17-4, . . .	A. E. Hopkins, . . .	Littleton, . . .	A. E. Hopkins, . .	4
6375-J, . . .	O. C. Pomeroy, . . .	Longmeadow, . .	- -	-
3400, . . .	E. F. Saunders, . . .	Lowell, . . .	J. G. Gordon, . .	1
1-12, . . .	H. A. Munsing, . . .	Ludlow, . . .	Ashley N. Bucher, . .	5
20, . . .	Jas. S. Gilchrest, . . .	Lunenburg, . . .	James S. Gilchrest, . .	4
1174, . . .	Geo. A. Cornet, . . .	Lynn, . . .	G. H. McPhetres, . .	2
- -	Andrew Mansfield, Jr., South Lynnfield.	Lynnfield, . . .	L. H. Twiss, . . .	2
- -	Watson B. Gould, . . .	Malden, . . .	W. B. Gould, . . .	1
319-W, . . .	Peter A. Sheahan, . . .	Manchester, . . .	P. A. Sheehan, . .	2
1-R or 1-W, . . .	Herbert E. King, . . .	Mansfield, . . .	Marvin J. Hills, . .	6
226-W, . . .	Wm. H. Stevens, . . .	Marblehead, . . .	W. H. Stevens, . .	2
117-2, . . .	Geo. B. Nye, . . .	Marion, . . .	J. Allenach, . . .	8
416 or 151-M, . . .	E. C. Minehan, . . .	Marlborough, . .	M. E. Lyons, . . .	4
43-3, . . .	Wm. G. Ford, . . .	Marshfield, . . .	P. R. Livermore, . .	7
31-2, . . .	Darius Coombs, . . .	Mashpee, . . .	W. F. Hammond, . .	8
13-3, . . .	Frank A. Tinkham, . . .	Mattapoisett, . .	Webster Kinney, . .	8
138-3, . . .	Geo. H. Gutteridge, . .	Maynard, . . .	A. Coughlin, . . .	4
106-4, . . .	Waldo E. Kingsbury, . .	Medfield, . . .	G. L. L. Allen, . .	6
53 or 138, . . .	Chas. E. Bacon, . . .	Medford, . . .	W. J. Gannon, . .	1
34-3, . . .	Phineas MacNutt, West Medway.	Medway, . . .	F. Hager, . . .	6
- -	- -	Melrose, . . .	J. J. McCullough, . .	1
156-6, Milford, . . .	Frank M. Aldrich, . . .	Mendon, . . .	F. M. Aldrich, . .	5
21-3, . . .	Edgar P. Sargent, . . .	Merrimac, . . .	C. R. Ford, . . .	3
229, . . .	Herbert Nichols, . . .	Methuen, . . .	A. H. Wagland, . .	3
232-W, . . .	W. H. Connor, . . .	Middleborough, . .	A. D. Nelson, . . .	7

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
8003-2, . . .	Thos. H. Fleming, Bancroft.	Middlefield, . . .	- -	-
62-2, . . .	Oscar H. Sheldon, . . .	Middleton, . . .	B. T. McGlauffin,	2
65-3, . . .	Elbert M. Crockett, . . .	Milford, . . .	P. F. Fitzgerald, . .	5
- -	Harry L. Snelling, . . .	Millbury, . . .	E. F. Roach, . . .	5
5-2, . . .	Chas. LaCroix, . . .	Millis, . . .	E. W. Stafford, . . .	6
322, . . .	Nathaniel T. Kidder, . . .	Milton, . . .	N. T. Kidder, . . .	7
No telephone, . .	S. R. Tower, . . .	Monroe, . . .	- -	-
12-22, . . .	O. E. Bradway, . . .	Monson, . . .	Robert S. Fay, . . .	5
713-22, Greenfield,	F. B. Gillette, . . .	Montague, . . .	Dennis F. Shea, . . .	5
164-4, . . .	D. C. Tryon, . . .	Monterey, . . .	- -	-
3-24, Russell, . .	Andrew J. Hall, . . .	Montgomery, . . .	- -	-
17-21, Copoke, N. Y.	G. W. Patterson, . . .	Mt. Washington,	- -	-
- -	- -	Nahant, . . .	T. Roland, . . .	2
16-5, . . .	Peter M. Hussy, . . .	Nantucket, . . .	C. C. Macy, . . .	8
31, . . .	Thos. J. Deignan, . . .	Natick, . . .	H. S. Hunnewell,	6
195-1, . . .	Howard H. Upham, . . .	Needham, . . .	E. E. Riley, . . .	6
No telephone, . .	Chas. L. Baker, . . .	New Ashford, . . .	- -	-
2280 or 353, . . .	Edward F. Dahill, . . .	New Bedford, . . .	C. F. Lawton, . . .	8
6-4, Gilbertville, .	Frank A. Morse, West Brookfield.	New Braintree, . . .	E. L. Havens, . . .	5
13-6, Sheffield, . .	E. M. Stanton, Mill River,	N. Marlborough,	- -	-
Pay station, . . .	Rawson King, Cooleyville,	New Salem, . . .	R. King, . . .	5
173-5, Newburyport.	Wm. P. Bailey, . . .	Newbury, . . .	Percy Oliver, . . .	3
380, . . .	Chas. P. Kelley, . . .	Newburyport, . . .	C. P. Kelley, . . .	3
30, N. S., . . .	W. B. Randlett, Newton Center.	Newton, . . .	W. W. Colton, . . .	1
41-5, . . .	Jas. T. Buckley, . . .	Norfolk, . . .	James T. Buckley,	6
205-W or 265, . .	H. J. Montgomery, . . .	North Adams, . . .	Franklin B. Locke,	5
821-W, . . .	Geo. A. Rea, . . .	North Andover, . .	Fred W. Phelan, . .	3
317-2, . . .	Chas. F. Gehrung, . . .	N. Attleborough,	F. P. Toner, . . .	6
5-13, . . .	Colby H. Johnson, . . .	N. Brookfield, . .	S. D. Colburn, . . .	5
33-3, . . .	Henry Upton, . . .	North Reading, . .	G. E. Eaton, . . .	1
165, . . .	F. E. Chase, . . .	Northampton, . .	Christopher Clarke,	5
45-5, . . .	T. P. Haskell, . . .	Northborough, . .	T. P. Haskell, . . .	5
71-5, . . .	W. E. Burnap, Whitinsville.	Northbridge, . . .	A. F. Whitin, . . .	5
2-3, . . .	Fred W. Doane, . . .	Northfield, . . .	F. W. Doane, . . .	5
29-11, . . .	Geo. H. Storer, . . .	Norton, . . .	G. H. Storer, . . .	6
11-4, . . .	John Whalen, . . .	Norwell, . . .	J. H. Sparrell, . . .	7
55-4, . . .	Frank W. Talbot, . . .	Norwood, . . .	Ebin F. Gay, . . .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
119-4, . . .	Frank W. Chase, . . .	Oak Bluffs, . . .	P. P. Hurley, . . .	8
17-5, . . .	Chas. H. Trowbridge, . . .	Oakham, . . .	C. H. Trowbridge, . . .	5
67-13, . . .	Frank M. Jennison, . . .	Orange, . . .	F. M. Jennison, . . .	5
33-2, . . .	James Boland, . . .	Orleans, . . .	A. Smith, . . .	8
15, . . .	Durand A. Witter, . . .	Otis, . . .	- - -	-
9-5, . . .	Olin D. Vickers, . . .	Oxford, . . .	C. G. Larned, . . .	5
53-12 or 53-3, . . .	James Summers, . . .	Palmer, . . .	C. H. Keith, . . .	5
- -	Fred L. Durgin, . . .	Paxton, . . .	F. L. Durgin, . . .	5
182-Y, . . .	M. V. McCarthy, . . .	Peabody, . . .	J. J. Callahan, . . .	2
144-3, . . .	Edw. E. Adriance, . . .	Pelham, . . .	Marion E. Ricnard- son, . . .	5
7-23, Bryantville, . . .	Jos. J. Shepherd, . . .	Pembroke, . . .	J. J. MacFarlan, . . .	7
54-3 or 12-5, . . .	Geo. G. Tarbell, East Pepperell, . . .	Pepperell, . . .	J. Tune, . . .	4
- -	Walter H. Pike, . . .	Peru, . . .	- - -	-
13-2, . . .	Geo. P. Marsh, . . .	Petersham, . . .	Daniel Broderick, . . .	5
176-6, Athol, . . .	Wm. Cowlbeck, Athol, R. F. D. . . .	Phillipston, . . .	W. H. Cowlbeck, . . .	5
871-M, . . .	Thos. F. Dumont, . . .	Pittsfield, . . .	- - -	-
33-22, . . .	Albert F. Dyer, . . .	Plainfield, . . .	- - -	-
283-J, North Attleborough, . . .	R. P. Rhodes, . . .	Plainville, . . .	Elmer Walden, . . .	6
451-M, . . .	Ira C. Ward, . . .	Plymouth, . . .	A. A. Raymond, . . .	8
11-14, Kingston, . . .	Thos. W. Blanchard, . . .	Plympton, . . .	D. Bricknell, . . .	8
19-4, Highland, . . .	A. W. Doubleday, Greenwich Village, . . .	Prescott, . . .	C. M. Pierce, . . .	5
13-4, . . .	Fred W. Bryant, . . .	Princeton, . . .	F. A. Skinner, . . .	5
49-11, . . .	J. H. Barnett, . . .	Provincetown, . . .	J. M. Burch, . . .	8
1, . . .	F. T. Billings, . . .	Quincy, . . .	A. J. Stewart, . . .	7
35-4, Randolph, . . .	R. F. Forrest, . . .	Randolph, . . .	Chas. Cole, . . .	7
1284-R, . . .	John V. Festing, . . .	Raynham, . . .	G. M. Leach, . . .	6
518-W, . . .	H. E. McIntire, . . .	Reading, . . .	H. M. Donegan, . . .	1
11-12, . . .	Benj. F. Monroe, Attleborough, R. F. D. . . .	Rehoboth, . . .	S. W. Robinson, . . .	6
- -	- - -	Revere, . . .	G. P. Babson, . . .	2
8-2, . . .	T. B. Salmon, . . .	Richmond, . . .	- - -	-
No telephone, . . .	Daniel E. Hartley, Mat-tapoisett, R. F. D. . . .	Rochester, . . .	Edw. F. Handy, . . .	8
55-X, . . .	John H. Burke, . . .	Rockland, . . .	F. H. Shaw, . . .	7
27-3, . . .	A. J. McFarland, . . .	Rockport, . . .	F. A. Babcock, . . .	2
22-6, Charlemont, . . .	Merritt A. Peck, Zoar, . . .	Rowe, . . .	- - -	-
3-13, . . .	Daniel O'Brien, . . .	Rowley, . . .	L. R. Bishop, . . .	3
279-2, Athol, . . .	L. G. Forbes, . . .	Royalston, . . .	A. H. Brown, . . .	5
8009-11, . . .	S. S. Shurtleff, . . .	Russell, . . .	- - -	-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS—*Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
13-3, . . .	Henry Converse, . . .	Rutland, . . .	H. E. Wheeler, . . .	5
- -	- -	Salem, . . .	Warren P. Hale, . . .	2
1-8, Amesbury, .	Jas. H. Pike, . . .	Salisbury, . . .	H. C. Rich, . . .	3
202-12, Winsted, Conn.	A. S. Strickland, New Boston.	Sandisfield, . . .	- -	-
43-2, Sagamore, .	J. R. Holway, . . .	Sandwich, . . .	B. F. Dennison, . . .	8
115, . . .	Chas. L. Davies, . . .	Saugus, . . .	T. E. Berrett, . . .	2
4-16, . . .	Clinton Tilton, Brier, .	Savcy, . . .	- -	-
129-3, . . .	E. R. Seaverns, North Scituate.	Scituate, . . .	P. S. Brown, . . .	7
399-L-5, Paw- tucket.	John L. Baker, Attle- borough, R. F. D.	Seekonk, . . .	G. W. Thompson, . . .	6
121-2, . . .	A. Alden Carpenter, . . .	Sharon, . . .	J. J. Geissler, . . .	6
26, . . .	Arthur H. Tuttle, . . .	Sheffield, . . .	- -	-
130-2, . . .	Chas. S. Dole, Shelburne Falls.	Shelburne, . . .	Chas. S. Dale, . . .	5
11-M, . . .	Milo F. Campbell, . . .	Sherborn, . . .	J. P. Dowse, . . .	6
16-21, . . .	A. A. Adams, . . .	Shirley, . . .	A. A. Adams, . . .	4
48-2, . . .	Edward A. Logan, . . .	Shrewsbury, . . .	Robt. C. Clapp, . . .	5
- -	N. J. Hunting, . . .	Shutesbury, . . .	E. Colfax Johnson, . . .	5
2632-M., Fall River.	Wm. F. Griffiths, Swan- sea, R. F. D.	Somerset, . . .	C. Riley, . . .	6
- -	- -	Somerville, . . .	A. B. Pritchard, . . .	1
3164-W, . . .	Louis H. Lamb, South Hadley Falls.	South Hadley, . . .	C. R. Frye, . . .	5
151-23, . . .	C. S. Olds, . . .	Southampton, . . .	C. S. Olds, . . .	5
13, Marlborough,	Harry Burnett, . . .	Southborough, . . .	H. Burnett, . . .	5
11, . . .	Aimes Langevin, . . .	Southbridge, . . .	A. Langevin, . . .	5
8-2, . . .	Benj. M. Hastings, . . .	Southwick, . . .	- -	-
77-4, . . .	A. F. Howlett, . . .	Spencer, . . .	G. Ramer, . . .	5
20, Indian Or- chard.	T. J. Clifford, Indian Orchard.	Springfield, . . .	J. Alden Davis, . . .	5
5-12, . . .	Joel T. Wilder, . . .	Sterling, . . .	J. H. Kilburn, . . .	4
Post Office,	Geo. Schneyer, Glendale,	Stockbridge, . . .	Brown Caldwell, . . .	5
176-3, . . .	Albert J. Smith, . . .	Stoneham, . . .	G. M. Jefts, . . .	1
121-3 or 8120, .	James Curley, . . .	Stoughton, . . .	W. P. Kennedy, . . .	7
134-J, Hudson, .	W. H. Parker, Gleason- dale.	Stow, . . .	Henry W. Herrick, . . .	4
6 21, . . .	Chas. M. Clark, Fiskdale,	Sturbridge, . . .	C. M. Clark, . . .	5
5-5, . . .	S. W. Hall, South Sud- bury.	Sudbury, . . .	W. E. Baldwin, . . .	4
46, . . .	A. C. Warner, . . .	Sunderland, . . .	Richard Graves, . . .	5
58-32, Millbury, .	R. H. Richardson, . . .	Sutton, . . .	Ransom H. Rich- ardson.	5
1911-J, . . .	E. P. Mudge, . . .	Swampscott, . . .	E. P. Mudge, . . .	2
468-W, . . .	Thos. L. Mason, . . .	Swansea, . . .	A. E. Arnold, . . .	6
320 or 1-W, . .	Fred A. Leonard, . . .	Taunton, . . .	L. W. Hodgkins, . . .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
30 or 26-5, . .	C. A. Fletcher, Baldwinsville.	Templeton, . .	J. B. Wheeler, . .	5
4249-J, Lowell, . .	Harris M. Briggs, . .	Tewksbury, . .	H. M. Briggs, . .	1
161-4 or 102-3, . .	Elmer C. Chadwick, Vineyard Haven.	Tisbury, . .	H. W. McLellan, . .	8
No telephone, . .	C. L. Vining, . .	Tolland, . .	- -	-
Central, . .	Chas. W. Floyd, . .	Topsfield, . .	C. W. Floyd, . .	2
11-2 or 37-2, . .	F. J. Piper, . .	Townsend, . .	G. E. King, . .	4
No telephone, . .	Walter F. Rich, . .	Truro, . .	J. H. Atwood, . .	8
1, . .	Otis L. Wright, . .	Tyngsborough, . .	C. J. Allgrove, . .	1
1-2, Lee, . .	H. E. Moore, . .	Tyringham, . .	- -	-
7-2, . .	E. M. Baker, Upton Center.	Upton, . .	G. H. Evans, . .	5
51-5, . .	Lewis F. Rawson, . .	Uxbridge, . .	Willard Holbrook, . .	5
455-M or 59, . .	Wm. E. Cade, . .	Wakefield, . .	W. W. Whittredge, . .	1
No telephone, . .	Warren W. Eager, . .	Wales, . .	M. C. Royce, . .	5
107-2, . .	J. J. Hennessy, . .	Walpole, . .	P. R. Allen, . .	6
6, . .	Geo. L. Johnson, . .	Waltham, . .	W. M. Ryan, . .	1
203-3, . .	Louis A. Charbonneau, . .	Ware, . .	F. Zeissig, . .	5
45-23, . .	Delbert C. Keyes, South Wareham.	Wareham, . .	J. J. Walsh, . .	8
46-6, . .	Jos. D. Vigneaux, West Warren.	Warren, . .	A. A. Warriner, . .	5
73-3, Orange, . .	Chas. A. Williams, . .	Warwick, . .	Chas. E. Stone, . .	5
12-4, . .	Lester Heath, . .	Washington, . .	- -	-
116, New ton North.	John C. Ford, . .	Watertown, . .	J. C. Ford, . .	1
- -	William Stearns, . .	Wayland, . .	D. J. Graham, . .	4
113-4, . .	Timothy Toomey, . .	Webster, . .	C. Klebart, . .	5
- -	John P. Doyle, . .	Wellesley, . .	F. M. Abbott, . .	6
No telephone, . .	John Holbrook, . .	Wellfleet, . .	E. S. Jacobs, . .	8
74-32, Orange, . .	Lewis B. Bowen, Wendell Depot.	Wendell, . .	G. E. Mills, . .	5
74, Hamilton, . .	Jacob D. Barnes, . .	Wenham, . .	Jas. E. Kavanagh, . .	2
3-21, . .	Fred E. Clark, . .	West Boylston, . .	R. K. Parker, . .	5
768, Brockton, . .	W. P. Laughton, . .	W. Bridgewater, . .	O. Belmore, . .	7
37-13, . .	J. H. Webb, . .	W. Brookfield, . .	J. H. Webb, . .	5
5-6, . .	Louis H. Flook, . .	W. Newbury, . .	Frank D. Bailey, . .	3
2067-W, . .	Dana S. Moore, . .	W. Springfield, . .	Geo. W. Hayden, . .	5
1-6, . .	Benj. P. Bissell, . .	W. Stockbridge, . .	- -	-
203-23, . .	Wm. J. Rotch, . .	West Tisbury, . .	H. W. Athearn, . .	8
75-3, . .	Thos. H. Treadway, . .	Westborough, . .	Geo. Hayden, . .	5
111-Y, . .	T. H. Mahoney, . .	Westfield, . .	- -	-
44-11, . .	Harry L. Nesmith, . .	Westford, . .	H. L. Nesmith . .	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — *Con.*

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
148-14, Easthampton.	C. A. Bartlett, Northampton, Stage.	Westhampton, .	- -	-
1-3, . . .	Windsor F. Neal, . .	Westminster, .	G. A. Sargent, .	5
1392-M, . . .	Benj. R. Parker, . .	Weston, . . .	E. P. Ripley, .	4
14-21, . . .	Frank Whalon, . . .	Westport, . . .	H. A. Sanford, .	8
123-M, Dedham,	Elmer E. Smith, Islington,	Westwood, . .	Martin Sorenson, .	6
154-W, . . .	Edgar S. Wright, . .	Weymouth, . .	C. L. Merritt, .	7
69-2, South Deerfield.	James A. Wood, . . .	Whately, . . .	Rylan C. Howes, .	5
104-14, . . .	C. A. Randall, . . .	Whitman, . . .	C. A. Randall, .	7
1-4, . . .	Henry I. Edson, . . .	Wilbraham, . .	F. B. Metcalf, .	5
4-11, . . .	J. A. Breckinridge, .	Williamsburg, .	- -	-
34-14, . . .	William Davies, . . .	Williamstown, .	Wm. Davies, . .	5
34-4, . . .	Howard M. Horton, .	Wilmington, .	O. McGrane, . .	1
29, . . .	Arlon D. Bailey, . .	Winchendon, .	G. W. Drury, . .	5
123-2, . . .	David H. DeCourey, .	Winchester, .	S. S. Symmes, .	1
201-12, Windsor, .	Amos Ferry, . . .	Windsor, . . .	- -	-
- -	- -	Winthrop, . .	M. F. Smith, Jr., .	2
110, . . .	Frank E. Tracy, . . .	Woburn, . . .	J. H. Kelley, .	1
7112, Park, . . .	Arthur V. Parker, . .	Worcester, . .	H. J. Neale, . .	5
10-22, . . .	Chas. Kilbourn, . . .	Worthington, .	- -	-
23-5 or 8037, . .	Geo. H. E. Mayshaw, .	Wrentham, . .	W. Gilmore, . .	6
53-33, . . .	Jos. W. Hamblin, . .	Yarmouth, . .	C. R. Bassett, .	8

THE APPLICATION OF FORESTRY TO MOTH WORK.

The work of applying forestry practice to the control of the gypsy moths has proceeded steadily and with gratifying success during the past year. This work was started hardly two years ago, and has grown until it is now one of the most important features of the activities of the department. The theory of the work as outlined in the last annual report — the removal from our woodlands as much as possible of the favorite food trees of the moths, and the substituting and encouraging of species more resistant to the moth attacks — has been confirmed by the test of actual practice. In the methods of carrying on the forestry operations, and in the utilization of the resulting products, great advances have been made during the past year.

The combating of moths in shade trees, orchards and parks is a different problem from their control in wild woodland. In the first case the chief value of the trees is in their beauty or fruit-producing capacity. Such trees are much more valuable than trees which are allowed to grow chiefly for the wood they will produce when cut, as is the case with forest trees. Therefore, it is possible to use much more expensive methods in controlling moth infestations on the valuable shade trees than in the relatively valueless forest trees. That is the reason why the forestry methods of control, which call for the cutting of individual trees rather than the saving of them, were established. Undoubtedly it would be possible to save most of our forest trees by using shade-tree methods, — by spraying, etc., — but the trees thus saved would not be worth the cost, and there is not enough money to do it. It would cost millions of dollars a year.

In Europe, where these moths have existed from time immemorial, less than 5 per cent. of the forest growth is of oak. In eastern Massachusetts fully 50 per cent. is of oak. We must get approximately the European proportion in this country before we can expect the natural agencies of parasites, disease and birds to control the moths as they do in Europe. If left alone the moths will do this by themselves and kill off most of the oak, leaving the resistant species to grow up in its stead. By cutting the oak we can hasten the process and prevent the tremendous economic waste that would follow the killing of the oak. We can also prevent the desolation and fire risk which would accompany the killing. We know this is true, for we already have several thousands of acres of dead oak in the State. Proper cuttings made before the infestation becomes too serious will materially check moth spread. Taken after serious eating the cutting will merely lessen the resulting loss and hasten the return of the land to forest conditions.

These moth thinnings are being carried on directly by the owners either in co-operation with the State or by themselves, rather than through the agency of the town authorities, as is the case of most of the other moth work. However, in many towns the local men are giving splendid aid in this work. Most of the towns have a sufficient financial burden in taking care



Stevens estate, North Andover. Putting sawdust on corduroy road used in logging.



Portable mill in operation on Stevens estate, North Andover. Process of rebuilding a hardwood forest injured by moths to one of white pine, which is moth resistant.

of their shade trees and roadsides. They have not the time nor the money to continually take care of the wild woodland. For owners who are willing to furnish the capital, the policy of this department has been to take complete management of the work, cutting the trees necessary to the best possible advantage, and selling the product afterwards. For other owners we have found buyers for the wood which we wanted cut, or have given advice and marked trees, etc., and left them to manage the cutting themselves. Many others have followed the example of the owners whom we have helped, and have done the thinning of their own accord.

The attempt in this work has been to put it on a firm business basis. The areas of large growth that have been cut have been lumbered according to the most modern methods, as would be done by any large lumber company. The smaller growth has been cut by the cord at the market price. Except where beauty or moth spread were factors, the owners have not been urged to carry on this work unless they could see before they started that it would at least pay for itself. The subject of utilization has been gone into most thoroughly. All the large wood dealers and brick yards have been called on, with the aim of persuading them to buy the wood which we have and will cut. New methods of utilization, such as chemical wood, charcoal, etc., have been studied. All the industries and dealers who use and buy oak lumber or logs have been written to, and many of them visited, in an attempt to find out what they want, so that the owners who cut may sell their product to them to the best advantage. In short, this office has been made a sort of clearing house for oak products, where the buyer and seller may meet.

As in the year previous, an attempt was made to get a complete list of all owners of infested woodland in the State. Many of these owners have since been written to and visited in an attempt to persuade them to practice forestry methods on their lands. Maps have been kept showing the infested areas, and also all lands examined. A card index of all owners to whom advice is given is also kept describing their peculiar conditions, and the attempt will be made to follow them up in future years; also an index of all oak buyers is maintained.

The educational and technical sides of the work have not been forgotten. A bulletin on thinning was published during the year and is being widely distributed. It tells how to do the work and contains many practical data. Any who have not received a copy and who are interested are invited to apply for one, which will be mailed without charge. Accurate cost data of all operations carried on under our management are being kept. We are now collecting data for an oak log rule, and also volume and yield tables, which we hope will be quite a contribution to technical forestry. Several towns in the moth-infested section were mapped this past summer in an endeavor to find out the exact forest and moth conditions. These maps will prove very valuable in carrying on the practical work.

This winter there are four trained foresters giving their whole time to this work, — two in the Boston office, one resident in the southeastern section, and one working on the technical data. On December 1, we had under our management five crews working on these thinnings in different sections of the State, including two portable saw mills. Before the winter is over we expect to have double that number of crews and mills at work. Besides that, there are a good many more engaged in thinning under our advice or stimulus, although not directly managed by this office. Several thousand acres will be thinned over this winter, and at least 20,000 cords of wood cut, also 2,000,000 or 3,000,000 feet of lumber and ties, making a total expenditure of private funds of probably \$75,000.

It is hard to make a report at this time because the operations are in full swing, and the work reported on is incomplete and so accurate figures cannot be given. Following is an attempt to tabulate just what has been accomplished from Dec. 1, 1913, to Dec. 1, 1914: —

Examinations. — The lands of 204 owners were examined by experts from this department, advice given, and in many cases detailed reports written. The total area included in these examinations was approximately 17,000 acres, situated in 81 towns or cities of the State.

Operations. — The following is a list of the thinning and cutting operations carried on during the past year, either under the direct management of this department or under its immediate

supervision. Some of these operations were started before the year covered by this report and finished within the year, while others are now started but will not be completed until 1915. There are a total of 25 operations covering an area of 1,103 acres.

OWNER.	Town.	Area (Acres).
Miss Edith Andrew,	Hingham,	4
Charles B. Barnes,	Hingham,	30
George H. Barton,	Stow,	12
Mrs. Alexander Churchward,	Boxford,	30
Erskine Clement,	Haverhill,	9
Mrs. Abby G. Davis,	North Andover,	6
Miss C. A. French,	North Andover,	35
Walter P. Frye,	Hudson,	12
A. H. Hodgdon,	Westwood,	12
Karlstein Estate,	Dedham,	82
Mrs. Alfred Rodman,	Dedham,	80
New Bedford Water Works,	Middleborough and Rochester, . .	300
Howard Marston,	Barnstable,	35
Province Lands,	Provincetown,	80
F. P. Royce,	Dedham,	2
W. E. Schrafft,	Weston,	60
J. Duke Smith,	Medfield,	10
Nathaniel Stevens,	North Andover,	110
Nathaniel Stevens,	Boxford,	15
United States Naval Magazine, . . .	Hingham,	60
Mrs. S. C. Wheelwright,	Cohasset,	10
W. A. Whitcomb,	Dedham,	32
Mrs. D. P. Wight,	Dedham,	2
Arthur Winslow,	Middleborough,	35
W. P. Wharton,	Groton,	40

Besides these operations many have been carried on under the supervision of the district moth superintendents, and many more under the advice of this department without further assistance.

Of the operations listed, 428 acres were actually cut over during the fiscal year of 1914. On them 4,718 cords of wood

were cut, 286 piles, 148 posts and 385 thousand feet of lumber, including railroad ties which would number about 4,000. On this work the owners have spent \$17,327.42, and the State has contributed merely the salary and traveling expenses of the forester managing and supervising.

Utilization. — One of the important parts of the work has been the disposal and sale of the wood cut in these thinnings. Besides selling the wood cut under our direct supervision we have attempted to aid owners who have cut on their own responsibility. This past year we have negotiated sales to the amount of nearly \$5,000. We have contracts for products worth about \$20,000, which will be filled as soon as delivery can be made. The owners themselves have sold about \$4,000 worth of wood which was cut under our direction. There remains to be sold about \$10,000 worth of wood which is already cut. Much of this will be sold as soon as it becomes dry enough to be merchantable.

These results are only a beginning in what must be accomplished in the woodlands of the State. The encouraging features are, first, that most of these operations have been on a paying basis. Only a few of them have resulted in any net expense to the owner. Most of them have shown a profit. From the \$17,300 spent last year the returns should be over \$23,000, a profit of \$5,000. This work has proven that the moths can be attacked in the woodland without the expenditure of large sums of money, as is necessary in the other methods of moth control. The one great need is of capital to finance these operations. The poor man who owns woodland may not be able to do this work, which will yield a profit in the end, because he cannot pay for the wood chopping. However, we hope to overcome this difficulty in a large measure in the future by finding purchasers for the wood before it is cut. Second, this work is on a practical and common-sense basis, and cannot help appealing to the ordinary citizen. Third, this work will result in better and more valuable forests for the Commonwealth in the future. The pine, which is the natural and more valuable species for the land, is being made to supplant the oak, which is not best suited for most of the land on which it grows, and which is worth only a tenth as much.

Furthermore, these operations stand as practical and easily accessible object lessons in the practice of forestry, and are awakening great interest in the subject among many of our citizens. Mr. Kneeland and the young men assisting him in this work are accomplishing a great amount of constructive moth and forestry work that is bound to prove of great future economic value.

FOREST MAPPING.

This last season the field work of the forest survey of Worcester County towns has been completed save for a portion of Hubbardston, which will have been finished shortly after this report goes to the printer.

A very thorough forest map of Winchendon, showing the character of growth on every portion of the town, was made in co-operation with the United States Bureau of Entomology. Mr. Ingall, of the United States Bureau of Entomology, and Mr. C. H. Guise, surveyor for this office, did the field work of forest mapping, being accompanied by Mr. Wilcox and Mr. Schaffner, respectively, experts from the United States Entomological Laboratory, who collected data for classifying and mapping areas according to their susceptibility to gypsy moth infestation. The field work was done by running the paced compass lines from one town line to the other every quarter mile, instead of every half mile as has been done in other towns. This quarter-mile strip in the field enabled Mr. Ingall to complete a very satisfactory detail working map showing in different colors the different combination of species. It is hoped the town will use this in eradicating the gypsy moth food, which would prove at the same time a long step towards converting the large woodland area of the town into a coniferous forest, practically immune from the gypsy moth. It is to be hoped that the town of Winchendon will co-operate with the Federal and State governments in this, since it would not only prove a valuable experiment on a large scale with gypsy moth conditions, but would make the woodland areas of Winchendon vastly more valuable than at present by converting large areas of practically worthless growth into pine. For Winchendon we have figures showing in detail the area in practically every combination of species for different sizes of growth.

Owing to serious insect conditions in Plymouth County it was thought best to begin mapping and estimating there before completing Worcester County. Five towns of Plymouth County were covered, approximately one-third the area of the county. The towns are Brockton, Hingham, Hanover, Middleborough and Carver.

For the Plymouth County work we have used, instead of pantographic enlargements, photographic enlargements of the United States Geological Survey maps, the scale being approximately 1 inch to 2,000 feet. This should prove a very satisfactory standard map for all the woods work of the different branches of the department. The cost of the maps is several dollars a town less than the old process, and the maps are far more satisfactory. Adopting this process and standard scale for all field maps should save the State many thousands of dollars. We acknowledge our indebtedness to Forester W. O. Filley of Connecticut for a valuable suggestion in connection with this process.

While figures of acreage estimates, and the estimate maps, are available for practically all the towns covered individually, they have not yet been tabulated for comparison. This should be completed in a few weeks, and shortly thereafter we hope to have the estimate maps colored, and to have them on file at the office easily accessible so that any one can get an idea visually of the character of growth in any section. It might be said here that our figures show forested areas of the towns averaging about 60 per cent., with forested areas of some towns as high as 80 per cent.

Another season we may try mapping forest areas from automobile, with the half-mile strip method used only on every fifth town. While much less satisfactory, especially unless done by a very capable man, the automobile mapping would be very much quicker and cheaper. By having every fifth town worked by the strip system, fairly accurate detail figures could be obtained for each county as a whole.

This mapping work has been done under the supervision of Mr. Harold Fay, who has also assisted in other important general forestry work as occasion demanded.

FOREST MANAGEMENT.

The increasing interest being shown each year by woodland owners in connection with the management of their holdings according to now well-established forestry principles is very encouraging. Requests have come in continually during the past season from owners desiring an examination of their forest property, and advice as to its proper management. These requests have been attended to in the order in which they have been received, and in every case a trained forester has made an examination and given either verbal or written advice in regard to the management of the property. A list of these examinations for the season just ended is as follows: —

NAME.	Location.	Area (Acres).
Appalachian Mountain Club,	Warwick,	42
R. H. Howe,	Worcester,	4
E. M. Chase,	Holyoke,	10
David Carriek,	South Royalston,	10
W. B. Cross,	Halifax,	140
W. B. Cross,	Brockton,	15
E. H. Pratt,	North Adams,	85
C. O. Prescott,	Westford,	500
A. R. Sharp,	Taunton,	75
State Board of Agriculture,	South Walpole,	400
E. L. Gillett,	Westfield,	300
Indian Spring Camp,	Plainfield,	250
Greenfield Women's Club,	Greenfield,	20
Mansfield Water Board,	Mansfield,	200
Metropolitan Water Board,	Northborough,	160
Nevins Library,	Methuen,	1
Mount Hermon School,	Gill,	50
Northampton Water Board,	Northampton,	30
Miss M. Deane,	East Taunton,	3
Northfield Seminary,	Northfield,	150
Hopedale Park Board,	Hopedale,	75
Irving Smith,	Ashburnham,	3,500
Tax Commission,	Williamstown,	1,000
Miss F. True,	Salisbury,	50

NAME.	Location.	Area (Acres).
C. L. Wilder,	Lancaster,	190
L. E. Bassett,	Southville,	210
Geo. Blake,	Lenox,	250
Walpole Park Board,	Walpole,	300
Mrs. A. W. P. Crocker,	Foxborough,	80
Dr. V. C. Pond,	Foxborough,	105
G. M. Deane,	Coldbrook,	75
A. Sedgewick,	West Stockbridge,	300
J. M. Heald,	Lincoln,	20
H. W. Smith,	North Grafton,	150
W. A. Gaston,	Barre,	100
Mr. Tucker,	Acton,	30
Dr. Cady Phipps,	Sherborn,	25
Boylston Manufacturing Company,	Jefferson,	42
D. W. Gaskill,	Blackstone,	143
Miss C. Hosmer,	Orange,	200
Foxborough Water Board,	Foxborough,	75
Miss Harriet Ames,	Shutesbury,	125
E. C. Wood,	Northfield,	50
State Colony,	Gardner,	1,600
State Colony,	North Grafton,	900
Worcester Country Club,	Worcester,	40
Alice H. Marsh,	Sturbridge,	10
B. Curtis,	Medfield,	40
F. O. Houghton,	Millis,	100
Mrs. M. B. Cutting,	Sudbury,	80
Miss Sarah Pratt,	Sudbury,	200
George Timmons,	Ware,	350
C. K. Ellis,	Carlisle,	20
John White,	Freetown,	65
Wellesley College,	Wellesley,	60
State Fish and Game Farm,	Palmer,	200
Blanche M. Brine,	Manomet,	40
Geo. A. Brooks,	Manomet,	10

Total number of examinations, 58; area covered, 13,255 acres; expense to owners, \$124.45.

Thinnings.

The department's work in connection with woodland thinnings has shown an increase this year over last. In some cases, and where so desired by the owner, this department has taken charge of the thinning operations from beginning to end, while in other cases the trees to be removed have been marked and the owners have supervised the remaining work themselves. Some of the places that have received attention this year are as follows:—

Wellesley College.—A heavy marking in the trees on about 60 acres was made during the fall. The marked trees are to be removed by the grounds superintendent and his men this winter. Stumps are to be cut low, brush burned, and the area will be in suitable condition in the spring to stock with conifers if the authorities desire to do so. The trees to be removed are mostly white oaks.

St. Augustine Farm.—Work was started last winter and is being continued at the present time on the 125-acre property known as the St. Augustine Farm, located in Foxborough, Mass. The operation consists of heavy, medium and light thinnings, clean cutting in places to be followed by planting. A fire line 75 feet wide and 2,000 feet long has been made during the past two months. The woodland consists of large, medium and small white pine and mixed hardwoods. One small stand of planted pine about twenty years old is making excellent growth.

Alfred Mellor Property.—This operation is continued from last season, and is at present under way on the 200-acre tract of Alfred Mellor, located in Cummington, Mass. It consists of a thinning in conifer and mixed hardwood growth, and is of especial interest on account of the very large size of many of the trees involved. There are several hemlocks on the tract that will run over 1,000 board feet per tree, and very large maples are numerous. Trees of such size are unusual in Massachusetts at the present time, and give one an idea of what the original forest of the State was like.

Mrs. W. A. P. Crocker.—This 80-acre tract, located in Foxborough, Mass., consists of one of the best pine stands remain-

ing in the section. About 50 acres is stocked with pure white pine of all ages up to ninety to one hundred years of age. A camp has been erected and a crew has been in the woods for the past three months removing marked trees. Several thousand feet of lumber have been cut from this tract up to date, and it is believed that, aside from putting the area in much better condition, the operation will show a profit to the owner. All wood products are to be used at the owner's mill. On this tract, also, is a planted stand of white pine twenty-two years old that is making good growth. Planted pine thirty-five to forty years old is also to be seen.

Boylston Manufacturing Company. — A thinning and clean-cutting operation is at present in progress on the 45-acre tract in Jefferson, Mass., owned by the Boylston Manufacturing Company of Easthampton. The thinning and clean cutting is to be followed by planting to pine in the spring. This operation is of interest as an indication that large business concerns owning forest land are beginning to realize that it is not good business policy to allow their holdings to remain idle and neglected.

Fire Line.

On the W. B. Cross property in Brockton, Mass., a fire line nearly 1 mile long and 60 feet wide has been made during the past two months. This fire line follows the highway for the entire distance, and in conjunction with the road itself makes an excellent line of protection against fire for the property of Mr. Cross. All brush was clean cut and burned.

Other places where the trees have been marked and work is to be done this winter are as follows: —

NAME.	Location.	Area (Acres).
W. A. Gaston Estate,	Barre,	20
Worcester Country Club,	Worcester,	40
H. W. Smith,	North Grafton,	100
State Hospital,	Taunton,	50
State Hospital,	North Grafton,	400
State Hospital,	Gardner,	1,000
Geo. Timmons,	Ware,	350
E. F. McSweeney,	Lake Boone,	5

This department is pleased to note that some of the State institutions are inaugurating a forest policy for their woodland property. This year something along forestry lines is being done on the woodland of the Taunton, North Grafton and Gardner State hospitals for the insane. It has been proven that the able-bodied men inmates of the insane institutions can do very well the needed work in the woodland areas owned by the various institutions, and thereby benefit not only the woodland and institutions, but themselves as well, for the forest work makes a very healthful occupation. At the Gardner colonies alone there are 75 or 80 inmates who will be employed this winter in improving the woodland areas of that institution. There are 600 or 700 acres of blank, or what is termed as absolute, forest land that can and should be planted with conifers during the next few years. This work can all be done by the inmates. It is planned to establish a nursery in the spring at the Gardner Colony that will stock 100,000 transplants a year for the next six years: The seedlings will be furnished by the department's nursery at Amherst.

The department is pleased to assist the various State institutions in any way in connection with the better management of their forest property. The combined areas of the various State institutions amount to thousands of acres, and it is certain that were a definite forest policy followed up on these areas much good would result.

Walpole Town Forest.

It is quite probable that during the coming year a definite start will be made towards establishing a permanent town forest in Walpole, Mass. The proposition has been considered by Mr. Charles Sumner Bird, Jr., chairman of the park board, and other citizens of the town during the past few months. A survey of 200 acres has been made, 100 acres more examined, and data collected in connection with the town forest plan, and it is hoped an appreciable start will soon be made in the matter. That a town forest is an excellent and valuable asset to a town cannot be disputed. There are many towns throughout the Commonwealth that have right at their very doors, so to speak, the property suitable for the making of excellent town forests, and it is hoped that during the next few years many towns will make a start along this line.

Surveys.

The following is a list of the lots taken over for reforestation: —

NAME.	Location.	Area (Acres).
Eleanor Johnson,	North Adams,	100
Marcus M. Brown,	Marlborough,	90
Harmon & Thayer,	Savoy,	35
W. G. Perry,	Medfield,	26
W. G. Perry,	Medfield,	12
W. G. Perry,	Medfield,	3

Surveys were also made of the St. Augustine Farm in Foxborough and of the Crocker lot in Foxborough.

Working Plans.

A working plan was made this year for the property of Irving Smith. This property consists of 3,350 acres in Ashburnham and 50 acres in Winchendon. The complete plan consists of (1) an examination, with estimates and recommendations in the form of a typewritten report; (2) a forest map covering the entire tract, based upon a lot survey by a professional surveyor and a timber survey by this office; and (3) a large scale detail map showing the areas recommended for treatment during the next ten years. The growth was divided into types, each of which was estimated separately. The general recommendations were made covering cutting, thinning and planting.

Specific recommendations were also made, to be followed closely for the first ten years, but subject to revision in the future to meet varying conditions.

If possible, working plans will be made during the summer of 1915 for the 1,600-acre tract of the State Colony at Gardner and the 900-acre tract of the State Colony at North Grafton. A certain amount of data has been procured in connection with a plan for the Fish and Game Farm of 200 acres in Palmer.



Extracting seed from pine cones, Fall River water commission, on Wautuppa Reservation.



Fifty-six year old plantation of white pine, Sharon, Mass. Will yield about 40,000 board feet to the acre. Our waste lands can be made to yield thus if replanted to pine.

Maps.

All unfinished maps were completed during the year. At the present time a large line map is being made for the use of observation stations in connection with forest fire work. Pocket field maps are also being made for use during the coming season.

NURSERY WORK.

Our principal advance in nursery work this past season was the leasing of 7 acres of remarkably fertile soil in the village of Barnstable. In the early spring a portion of the ground was cleared and plowed, and 300 12 by 4 feet seed-beds were placed in position. These beds are of the latest type wooden frames, with wire sides and a combined wire and lath cover screen. In addition, some 200,000 pine, spruce and ash were set in as transplants. The seed-beds have shown remarkable germination, and will produce an immense crop of two-year seedlings one year hence. Water is supplied by a gasoline engine pumping from a well to an elevated tank. A small but neat building to serve as a camp for the men and a storehouse for tools was also erected. Only one-half of the 7 acres is at present in use, but by next spring the entire area will be ready for transplanting.

The nursery at Sandwich, which, owing to the sandy soil and the difficulty of getting water, was unsuccessful, has been discontinued.

We also did no further transplanting at Hopkinton, where we have in the past set in some surplus stock that could not be accommodated at Amherst.

The nursery which we operate in co-operation with the State Farm at Bridgewater this spring suffered severely from frost heaving. We lay this to two causes, — fall transplanting and the rawness of the soil, which had just been newly cleared and never cultivated. We shipped 100,000 seedlings to take the place of those heaved out, and do not anticipate that the same trouble will occur again. If it does, another site can be selected for future work.

The Amherst nursery has been our main source of supply during this year, as it has been in the past. One hundred and

fifty of the latest type seed-beds have been installed, and water conditions improved by the laying of a larger main from the college grounds to the connection with our nursery. A telephone also aids materially in the transaction of business.

Three classes of stock are shipped from our nursery. The first is for use on the lots which we have taken over under the reforestation law, and is largely transplanted material. The second class goes to other State institutions, which under the nursery law we furnish with forest planting stock, and is partly transplanted and partly seedling material, according to whether it is intended for use in the field or for the transplanting in their own nurseries. The third class is seedling material which we send to our nurseries for transplanting.

STOCK FOR PLANTING ON REFORESTATION LANDS.

White pine (four-year transplants),	390,000
White pine (three-year transplants),	210,000
Norway spruce (three-year transplants),	16,000
White ash (two-year seedlings),	5,000
European larch (two-year seedlings),	6,000

STOCK SHIPPED TO OTHER STATE DEPARTMENTS.

Metropolitan Park Commission (two-year seedlings),	200,000
Metropolitan Water Board (two-year seedlings),	300,000
Fisheries and Game Commission (two-year seedlings),	50,000
Fisheries and Game Commission (three-year transplants), . . .	3,000

REFORESTATION WORK.

The lands taken over under the terms of the reforestation law can be divided into two classes. The first is land purchased outright by the State, which it is probable it will hold as a permanent investment, and the second is land which private owners have deeded to the State without cost, for the purpose of having the State Forester plant and care for it for a period not to exceed ten years, when they will redeem the land by paying the cost of reforesting and maintenance. The first we call purchased lands, and the second deeded lands.

Reforestation work usually partakes of two operations, — planting and brush cutting. On old pasture land, and often on cut-over pine land where sprout or bush growth does not come

in very rapidly, planting is the only work necessary, but in cut-over hardwood land, or on very brushy pastures, it is necessary to clear the brush in whole or in part either before or after planting. As a usual thing such brush clearing is not done until a year or two after the planting, because the shade of the sprouts is a useful factor of protection for the newly planted pines. However, where sprout growth is exceedingly dense it must be cleared before planting can be attempted.

It is evident from the above that in addition to the new work carried out each year there must be more or less done along the lines of maintaining and improving the growing plantations. Not only must the growing pines be freed from encumbering hardwood sprouts, but blanks in the stand due to drought or other causes must be filled in and losses by fire made good. Fences must be repaired and kept up. We are glad to say, however, that fire losses have been comparatively few. During the past year we have lost through fire one lot of 20 acres in Dennis and one of 15 acres in Oakham.

NEW WORK, 1914.

Purchased Lands.

OWNER.	Town.	Area (Acres).	Number of Trees planted.	Brushed (Acres).
Fenno,	Westminster,	100	85,000	100
Fiske,	Buckland,	75	70,000	25
Rice,	Spencer,	40	50,000	—

Deeded Lands.

Irving Smith,	Ashburnham,	150	70,000	—
Eben Smith,	Barnstable,	17	20,000	17
Webster,	Warwick,	50	51,000	—
Lewis,	Groton,	18	14,000	—
Johnson,	North Adams,	100	50,000	5
Baker,	Phillipton,	10	11,000	—
Perry,	Medfield,	35	15,000	—

MAINTENANCE WORK.

Lot Number.	Town.	Area (Acres).	Nature of Work.
75	Oakham,	18,000 ¹	Filling in blanks.
91	Spencer,	20,000 ¹	Filling in blanks.
11, 12	Spencer,	60	Brushing.
22	Hubbardston,	10	Brushing.
26	Templeton,	60	Brushing.
6	Templeton,	30	Brushing.
37	Templeton,	50	Brushing.
53	Hubbardston,	25,000 ¹	Replanting.
3	Hubbardston,	15,000 ¹	Filling in.
16	Westminster,	30 ²	Brushing and filling in.
38	Ashburnham,	20	Brushing.
8	Ashburnham,	4	Brushing.
80	Rutland,	6,000 ¹	Filling in.
74	Dover,	14	Brushing.
7	Andover,	20	Brushing.
25	Rowley,	8	Brushing.
114	Manchester,	5	Filling in.
50, 51	Hopkinton,	30 ³	Brushing and filling in.

¹ Number of trees used in filling in. The area covered would vary greatly on different lots.

² 10,000 trees used in filling in.

³ 20,000 trees used in filling in.

To summarize the above tables: along the line of new work, planting equals 500 acres and brushing, 150 acres; in the line of maintenance, planting is equivalent to 115 acres and brushing to 340 acres.

When we say the planting is equivalent to 115 acres we mean that the number of trees used in filling in, if planted 6 by 6 feet apart, would cover that area. The actual area covered is much greater.

THE STATE FIRE WARDEN'S REPORT.

MR. F. W. RANE, *State Forester*.

SIR:—In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year:—

While we have experienced a very serious drouth during the summer and fall of 1914, and our number of fires exceeds by a large margin that of any former year in the history of the department, we have been able, by the efficient work of our men and the hearty co-operation of many residents of the Commonwealth, to hold our loss to a remarkably low figure. With a period of thirty-eight days, from September 9 to October 17, with only one-fourth of an inch of rainfall, and during this period a legal holiday, October 12, which was also the opening day of the hunting season, with 60,000 hunters and as many more pleasure seekers roaming through the woods from Cape Cod to the Berkshire Hills, it is not surprising that many dangerous fires occurred. On this date our reports show 166 fires reported, mostly confined to Middlesex, Worcester and the western counties. Of the above fires, 13 were dangerous, and burned over an area of nearly 8,000 acres. While the area burned was not all forested land, considerable timber was destroyed. Most of these fires would have been controlled at the start providing our observation system had been completed in this locality, but it is necessary that 7 more stations be established throughout the central and western part of the State in order to fully protect this area. On October 12 there were 166 fires, and for the week ending October 17, 384 fires were reported. Owing to the large number of fires at this time, His Excellency the Governor was obliged to declare a close season on game extending to October 17.

We have maintained the same arrangement of districts as in former years, viz., four districts, each under the supervision of a district forest warden; but owing to our construction work throughout the eastern part of the State being done entirely by the district men, they have been unable to devote as much time to organization work in their several towns as had been hoped. This difficulty will be overcome as our system becomes completed, and we are in hopes that another year will practically finish the construction work.

The amendment of the forest law relative to the appointment of town forest wardens, allowing such appointments to be made in January instead of in March and April, has facilitated the work of this department, as we are enabled to have our lists completed during February and in readiness for spring fires. I am still of the belief that much better results would be accomplished throughout the State if this department were to appoint these town forest wardens. We are handicapped in a number of towns by having inefficient wardens who do not have the faculty of handling men and who are not interested in the protection of the forests. I firmly believe that our district men can recommend to this department in the different towns throughout their districts men who have the interests of the Commonwealth at heart and who would make ideal forest wardens, — men who would co-operate with our observers, perfect a forest fire-fighting organization in their towns, and not only be the means of lessening the expense of extinguishing fires, but also materially reduce the damage.

OBSERVATION STATIONS.

We have had in operation this year 24 observation stations reporting 3,013 fires, as follows: —

Becket Mountain, Becket,	63
Blue Hill, Milton,	236
Bluff Head, Sharon,	203
Bonney Hill, Hanson,	68
Bournedale, Bourne,	54
Copecut Hill, Fall River,	33
Cran Pond Hill, Ashfield,	2
Fay Mountain, Westborough,	386
Grace Mountain, Warwick,	94
Hart Hill, Wakefield,	174
Harwich, Harwich,	35
Howland's Hill, Falmouth,	1
Lincoln Mountain, Pelham,	47
Massacmet Mountain, Shelburne Falls,	130
Middleborough, Middleborough,	133
Mt. Tom, Easthampton,	135
Morse Hill, Essex,	96
Reservoir Hill, Plymouth,	116
Richmond Hill, Dighton,	105
Robbins Hill, Chelmsford,	302
Shoot Flying Hill, Barnstable,	14
Steerage Rock, Brimfield,	90
Tower Mountain, Savoy,	11
Wachusett Mountain, Princeton,	485
Total,	3,013

Of the above stations five were new this year, four of which were placed in operation late in the season. Two substations, one on Prospect Hill in Petersham, and one on Little Mugget Hill in Charlton, it was not deemed advisable to use this season.

A new steel tower 40 feet high, with a 10 by 10 foot room at the top, has been erected on Shoot Flying Hill, Barnstable, to replace the old wooden structure that had been in use for nineteen years. The new tower is 10 feet higher than the former one, and gives an excellent view for a radius of 12 miles.

During the season an observation room for the Bournedale tower has been completed. A new 40-foot tower has been erected on Howland's Hill, Falmouth, which enables us to protect several other towns.

A new 60-foot steel tower has been erected on Copecut Hill in Fall River. This is located near the Watuppa Reservation and protects a large forested area in Fall River and adjoining towns. The city of Fall River, as well as the towns of Westport and Dartmouth, contributed very liberally toward the expense of erecting this tower.

An observation station has been established on Prospect Hill, Petersham, but no tower was erected. One mile of telephone line was con-

structed. This station protects the Harvard School holdings of several thousand acres.

A wooden tower, with 1 mile of telephone line, has been installed on Cran Pond Hill in Ashfield. This is one of several stations that are needed in western Massachusetts to protect the large forest areas in that portion of the State.

The observation towers have again demonstrated their value in the large number of fires reported and extinguished in their incipiency. The following comparative statement of forest fires during the year 1911 with those of 1914 is very interesting, the 1911 loss being before the present fire lookout system was established.

COMPARATIVE TABLE OF FIRES, 1911 AND 1914.

	Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1911,	2,536	99,693	\$47,093	\$537,749	39.31	\$226 24
1914,	3,181	38,975	48,750	95,389	12.25	29 98

These figures are very significant. The period of drouth was more serious and considerably longer in 1914 than in 1911, thereby making the fire danger much greater. In studying this table you will note that we had 645 more fires in 1914 than in 1911, but that our damage was reduced nearly \$450,000 in 1914. Again, the average damage per fire in 1911 was \$226.24 as against \$29.98 this year.

While we have had some large fires, they are not chargeable to the inefficiency of our observers or to their neglect of duty. I have in mind an instance where the observer called up the town forest warden, giving him the exact location of a fire which was just starting. The warden, being doubtful, telephoned two or three parties near the location of the fire and received the reply that they were unable to discover any fire. Two hours later he received a telephone call stating that the fire had then covered 50 acres. The outcome was that 500 acres were burned over.

We have had an unusually large number of visitors to the towers this year, and I believe that when pleasure-seeking automobilists become familiar with our roads leading to within a few minutes' walk, and in many cases directly to the towers, this number will be materially increased. Our towers are nearly all equipped with stairs, so that they are accessible to any one. We are always pleased to have the public visit them, not only because of the pleasure they may derive from the beautiful scenery for miles around, but also from an educational standpoint. Our observers are always very courteous and take pleasure in explaining our system, giving visitors a comprehensive idea of what the State is endeavoring to do to suppress our forest-fire evil.

PROPOSED STATIONS.

I am in hopes that during the coming year we shall have sufficient appropriation to install the following observation stations, thereby practically completing our system: —

Nobscot Hill, Framingham.
Great Meadow Hill, Rehoboth.
Miscoc Hill, Mendon.
Lair Hill, Tolland.
Holcomb Hill, Chester.
Berlin Mountain, Berlin.
Yokums Seat (Pinnacle), Lenox.
Mt. Everett, Mount Washington.

The last three would be maintained jointly by Massachusetts, Vermont, New York, Connecticut and the Federal department.

FOREST-FIRE EQUIPMENT.

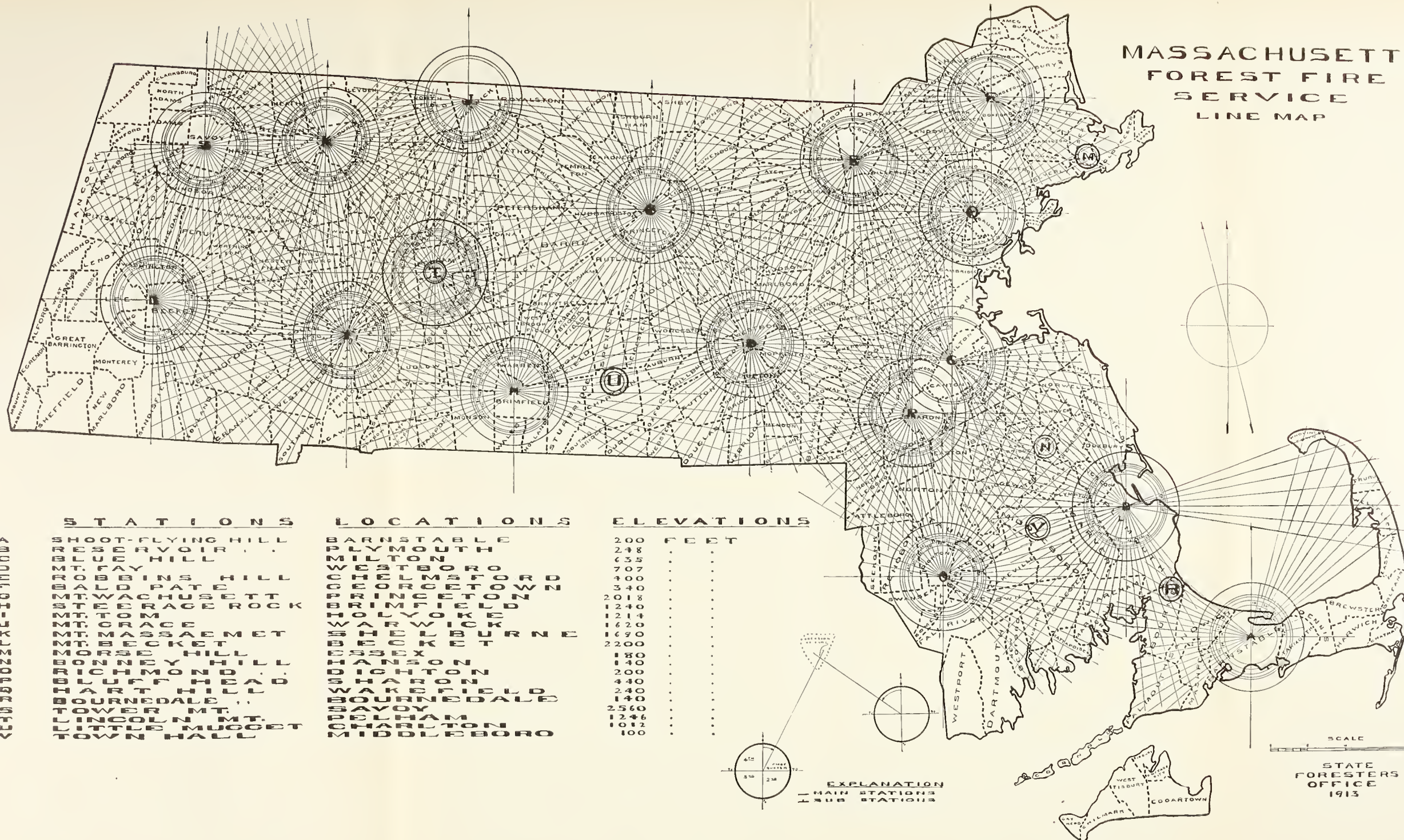
Under an act of the Legislature, passed in the spring of 1910 and amended in 1914, appropriating \$5,000 annually for forest-fire protection, towns with a valuation of \$1,750,000 or less are entitled to 50 per cent. reimbursement on all forest fire-fighting equipment they desire to purchase not exceeding \$500, no town being allowed an amount exceeding \$250. All forest-fire equipment purchased under this act is approved by this department and placed under the supervision of the town forest warden, subject to inspection at all times by the State Fire Warden or the district forest wardens.

There are at the present time 165 towns entitled to reimbursement under the act. Of this number, 120 towns have expended a portion, and in some instances all, of their allotment, as is shown in our inventory of equipment on page 50. Nearly all the towns throughout the eastern part of the State that come under the act have taken advantage of it, but we still have many towns in the central and western portions of the State that have not. We limit the towns to the purchase of equipment that is suitable for forest-fire work, such as motor trucks, fire wagons, pumps, extinguishers, water cans, pails, shovels, brooms, etc. Owing to the financial condition of many of our smaller towns it has been extremely hard this year to get appropriations for purchasing forest-fire equipment. Our table on page 54 shows, however, that 50 towns have taken advantage of the act and have been reimbursed to the amount of \$2,127.05.

RAILROAD FIRES.

It is certainly very gratifying to note the marked improvement that has been made during the past three years by the railroads throughout the Commonwealth in endeavoring to lessen the number of forest fires

MASSACHUSETTS FOREST FIRE SERVICE LINE MAP



STATIONS

LOCATIONS

ELEVATIONS

FEET

SHOOT-FLYING HILL	BARNSTABLE	200
RESERVOIR	PLYMOUTH	248
BLUE HILL	MILTON	635
MT. FAY	WESTBORO	707
ROBBINS HILL	CHELMSFORD	400
BALD PATE	GEORGETOWN	340
MT. WACHUSETT	PRINCETON	2018
STEERAGE ROCK	BRIMFIELD	1240
MT. TOM	HOLYOKE	1214
MT. GRACE	WARWICK	1620
MT. MASSAEMET	SHELburne	1690
MT. BECKET	BECKET	2200
MORSE HILL	ESSEX	180
BONNEY HILL	HANSON	140
RICHMOND	DIGHTON	200
BLUFF HEAD	SHARON	440
HART HILL	WAKEFIELD	240
BOURNEDALE	BOURNEDALE	140
TOWER MT.	SAVOY	2560
LINCOLN MT.	DELHAM	1246
LITTLE MUGGET	CHARLTON	1012
TOWN HALL	MIDDLEBORO	100

EXPLANATION
— MAIN STATIONS
— SUB STATIONS

STATE
FORESTERS
OFFICE
1913

caused by locomotives. For the past two years this department, in co-operation with the Public Service Commission, has maintained a system of inspection of spark arresters and ash pans at the different railroad terminals in the State, and the inspections made this year certainly show that extra precautions have been taken by the railroad officials to keep their ash pans and screens in perfect condition. While we have found defects, they have been mostly minor ones and have been promptly repaired. In nearly all instances the railroads have complied with the law relative to keeping the right of way free from all combustible material, and several miles of lands adjoining the right of way have been thinned out so that where this work has been done there is very little danger of fire making much headway in case it should start.

The reports show that the percentage of railroad fires has been reduced to 26 per cent. and the loss to \$16,000, which is the lowest railroad fire damage of which we have any record. With over 2,000 locomotives in operation we must expect a certain percentage of fires from this source, but the efforts put forth by the railroads show that they can be reduced to a minimum, and I feel that due acknowledgment should be given to Mr. E. A. Ryder of the Boston & Maine, Mr. R. D. Smith of the Boston & Albany, Mr. Chas. B. Rood and Mr. G. W. Wildin of the New York, New Haven & Hartford for their hearty co-operation with this department. Our reports show that we have had 830 railroad fires, as follows: New York, New Haven & Hartford, 389; Boston & Albany, 128; Boston & Maine, 253; and Central Vermont, 60, burning over a combined area of 4,508 acres, with a damage of \$16,649 and a cost to extinguish of \$4,884.

The following information has been received from the Boston & Maine and Boston & Albany railroads relative to fire-prevention work done by them during the past year: —

BOSTON & MAINE RAILROAD, DEPARTMENT OF FIRE CLAIMS,
BOSTON, MASS., Dec. 21, 1914.

MR. M. C. HUTCHINS, *State Fire Warden, Boston, Mass.*

DEAR SIR:— In accordance with your request for information regarding the fire-prevention work done by this company during the past season, we beg to submit the following: —

Although there was a great deal of snow last winter, which remained up to the middle or last of March, the high winds immediately following its departure made everything extremely dry, and conditions were favorable for fires. In April, May and June it was hot and dry, and there were many fires; in July and August there was considerable rain, and we had reports of only 98 fires on the whole system in July and 45 in August; but September, October and November were generally dry, — in fact, the weather was much like real summer days, and fires were numerous. There was a very noticeable increase in the number of reports of fires as soon as the hunting season opened, and it was most fortunate that His Excellency Governor Walsh was so quick to scent the danger and prompt in taking steps to relieve it. Comparing this season with the very bad season of 1913, they average about the same, although this season the fires supposed to have been set by sparks from locomotives have not shown as much damage, which we think is accounted for in a large measure by the prompt discovery and fighting of fires.

Since the 1st of last March we have secured 16 permissions from the owners of land adjacent to our property in Massachusetts to clear back a strip for say 100 feet from our right-of-way fence, and this work has been completed. We hope the new Massachusetts law which will take effect Jan. 1, 1915, requiring operators to clear back the brush for a distance of 40 feet from our right of way will be of great assistance in keeping down the fire hazard, as a similar law in New Hampshire, with the prescribed distance only 25 feet, has certainly produced good results, and when owners or operators have been clearing the slash we have in many cases persuaded them to remove it a greater distance than required by law.

In addition to the customary inspection which is made of the spark arrester and ash pan on all our locomotives, since March 1, 1914, we have requested special inspections made of 433 locomotives reported as setting fires, with the result that only 56 were found to have any defect, most of these being very slight. We mention this only to show that the matter of inspection of locomotives is receiving more than routine attention.

Last June we placed a "fire warning" card in all of our principal stations and terminals, believing it is absolutely necessary to keep *fire prevention* constantly before the eyes of the public. While it is difficult for any one to really know how much value there is in publicity, from remarks we have heard, and the many inquiries we have received from various people, about this subject we feel positive that it is beneficial; for instance, the superintendent of schools in Winchester, Mass., requested a supply of these cards so that the subject could be discussed with and placed before the school children in his town.

During the past season we have given special attention to improving the patrol service in dangerous sections on our system, and the result has been very gratifying to us.

During the past year much more effective co-operation has been attained with the towns in the matter of discovering and promptly fighting fires, and we are pleased to speak most highly of the faithful attention of the "lookout" men and the splendid work of the fire wardens. The bills from the towns for fighting fires are now rendered promptly after each fire, properly made out on the standard form, with explanation of the detail, which assists us in approving their payment. Practically every town with which we have had dealings has accepted the rate of 25 cents an hour for fighting fires; and all this co-operation and assistance is in a large measure the result of the splendid efforts on the part of your district chiefs.

Yours truly,

E. A. RYDER,
Commissioner.

Statement by the Boston & Albany Railroad (New York Central Railroad Company, Lessee).

The Boston & Albany Railroad, during the year 1914, reduced both the number and extent of the fires on its right of way and adjoining property, the number of fires reported being the smallest since 1908. The co-operation of the employees of the company and the fire wardens in the cities and towns through which the railroad runs contributed largely to this result. There have been no extensive forest fires along the line of the road during the present year.

All buildings have been equipped throughout with fire extinguishers of an approved type, hand grenades, fire buckets, with tubs filled with water and painted red and marked "For use in case of fire only." Regular periodical inspection of this equipment is made, and instructions are in

effect that the fire buckets and tubs are not to be obstructed or used for any other purpose.

The use of wooden shingles has been discontinued altogether, and adjacent to the right of way all new roofs are now covered with either asbestos shingles, slate or tin. Fireproof paint has been used to a considerable extent in the interior of buildings.

Special zinc-lined receptacles have been provided outside of buildings where stoves are used, for taking care of ashes and cinders from the stoves.

Regular inspection is made underneath all wooden platforms, and all rubbish and paper refuse, etc., is removed.

Instructions are in effect that the right of way shall be carefully and completely burnt over at least twice a season, and oftener if necessary; and that such operations shall be carried on in co-operation with the local fire warden, and if necessary with owners of adjacent property. In some cases where there has been added risk, permission from owners of adjacent property has been obtained and railroad employees have done the burning. In places where the likelihood of fire is great, additional vigilance is used, and in some places patrols are placed. Section cars within the zones most subject to fires are all furnished with approved extinguishers, which are carried at all times on the car during the season fires are most likely to occur. On many occasions these have been found to be of great service.

All Boston & Albany locomotives are now equipped with a standard smoke-box arrangement with netting, which has been approved by the Public Service Commission of Massachusetts. The ash pans have wire screens to prevent live coals and cinders from being thrown out onto the tracks or right of way, and comply with the regulations of the Public Service Commission. All the locomotives operating on the Newton circuit are equipped with special patented exhaust pipes, which soften the exhaust and greatly reduce the number of sparks thrown from the stacks. On some of the locomotives the overflow pipes from the injectors have been relocated so as to discharge into the ash pans, thus cooling off the hot cinders in the pan. The smoke-box netting of all the locomotives is inspected at regular intervals and corrected before the locomotive is allowed to go into service. A number of locomotives used in switching in yards are equipped with fire extinguishers according to law and in compliance with orders of the Public Service Commission, and all car and locomotive shops are equipped with fire extinguishers and fire hose, with special men designated to man this hose in case of fire. Fire drills are also had at regular intervals.

FEDERAL CO-OPERATION.

The co-operative work carried on in the State in connection with the Federal department in protecting the watersheds of the Nashua, Chicopee, Miller, Thames, Blackstone, Hudson, Connecticut and Deerfield rivers has allowed us to better protect the central and western portions of the State than would have otherwise been possible. An allotment of \$2,500

was made to us by the Federal department for this purpose, to be expended in payment of observers. This practically maintained our observation stations west of the east line of Worcester County. I am in hopes that as we extend our observation system in this portion of the State this allotment may be increased to meet, at least partially, the increased cost of maintenance.

CO-OPERATIVE FOREST FIRE CONFERENCE.

Through an invitation extended by this department to the State foresters of the New England States, New York and Pennsylvania, and the Federal department, a co-operative forest fire conference was held in this city on Jan. 20, 21 and 22, 1914, at which the following program was carried out:—

January 20, Morning Session, 9 A.M.

Chairman, State Forester F. W. RANE.

The "Weeks Law," Co-operative Fire Protection and Federal Requirements in its Administration, Mr. J. G. Peters of the United States Forest Service.
Lookout System, Telephone Construction and Telephone Contracts, Mr. Wm. G. Howard, New York.

Afternoon Session, 1.30 P.M.

Chairman, Mr. W. O. FILLEY of Connecticut.

Interstate Co-operation in the Reporting of Forest Fires, Mr. F. W. Rane.
Co-operation with Rural Mail Carriers, Mr. Blaine S. Viles, Maine.
Forest Fire Patrol, and Co-operation with Private Owners, Mr. E. C. Hirst, New Hampshire.

January 21, Morning Session, 9 A.M.

Chairman, Mr. E. C. HIRST.

Publicity as a Valuable Adjunct in Forest Fire Prevention Work, Mr. Chas. P. Wilber, New Jersey.
Slash Disposal, Fire Lines and Trails, Mr. A. F. Hawes, Vermont.
Methods of handling Severe Forest Fires, Mr. Wm. G. Howard, New York.
General Discussion of Unassigned Topics.

Afternoon Session, 1.30 P.M.

Chairman, Mr. A. F. HAWES.

Railroad Fire Protection, Mr. W. O. Filley, Connecticut:—

- (a) Equipment of locomotives with suitable fire protective devices.
- (b) Methods of securing satisfactory inspection of railroad rights of way and provision for the removal of all inflammable material from the same.
- (c) Railroad fire lines.
- (d) The disposal of slash on privately owned lands adjacent to railroad rights of way or highways.

Representatives from the New York, New Haven & Hartford, Boston & Maine, Boston & Albany and New York Central & Hudson River, Central Vermont and Rutland railroads were in attendance during this discussion.

Reception at New American House, 5.30 P.M. Banquet, 6 P.M. Mr. F. W. Rane, Toastmaster.

Addresses by Mr. E. A. Ryder of the Boston & Maine Railroad, Mr. C. N. Woodward of the New York, New Haven & Hartford Railroad, Mr. J. H. Foster of the New Hampshire State College, Mr. Harris A. Reynolds, Secretary of the Massachusetts Forestry Association, Mr. A. F. Hawes, State Forester of Vermont, and others.

January 22, Morning Session, 9 A.M.

Mr. W. L. LARRY of the Massachusetts Public Service Commission in charge.

Inspection of the different style spark arresters used by the Boston & Maine and New York, New Haven & Hartford railroads, including the Mudge-Slater and the Stearns spark arresters.

Afternoon Session.

Mr. M. C. HUTCHINS, Massachusetts State Fire Warden, in charge.

Inspection of observation tower and equipment, also modern forest-fire wagon, at South Hanson.

Among those present were Mr. Robert S. Conklin, Commissioner of Forestry, Harrisburg, Pa., Mr. Jesse B. Mowry, Commissioner of Forestry, Chepachet, R. I., Robert M. Ross, State Fire Warden, Burlington, Vt., Allen Chamberlain and Harris A. Reynolds representing the Massachusetts Forestry Association, as well as many representatives of woodland owners, who took part in the discussions. A very interesting and instructive meeting was enjoyed.

FOREST WARDEN CONFERENCES.

During the months of February and March this department held a series of forest warden conferences throughout the State. These were held at Pittsfield, Greenfield, Worcester, Fitchburg, Springfield, Haverhill, Middleborough and Boston. The object of the meetings was that employees of the department might get in closer touch with the town forest wardens and selectmen, and discuss with them the different methods of handling forest fires, the organizing of forest fire-fighting crews, the appointing of deputies located in the outlying portions of the different towns, and the importance of procuring suitable equipment for handling forest fires.

These meetings were very instructive and were attended by nearly all the forest wardens throughout the State, each one being free to discuss matters pertaining to his locality. Short talks were given by members of this department on the general outline of the system and work. Mr. E. A. Ryder of the Boston & Maine Railroad and Mr. Chas. B. Rood of the New York, New Haven & Hartford Railroad were in attendance, and explained fully what these railroads are endeavoring to do in order to lessen the expense caused by railroad fires.

The following law enacted this year relative to the disposal of slash and brush is a forward step toward reducing our forest-fire hazard. While the law is not as broad and as far-reaching as I would desire, at the same time it will necessitate the removal of much dangerous slash accumulating along highways and railroad rights of way, and will protect areas adjoining land where wood and lumbering operations are being carried on.

ACTS OF 1914, CHAPTER 101.

AN ACT RELATIVE TO THE DISPOSAL OF SLASH OR BRUSH FOLLOWING WOOD OR LUMBER OPERATIONS.

SECTION 1. Every owner, tenant or occupant of land, and every owner of stumpage, who cuts or permits the cutting of wood or timber on woodland owned or occupied by him or on which he has acquired stumpage by purchase or otherwise, and which borders upon the woodland of another or upon a highway or railroad location, shall clear the land of the slash and brush wood then and there resulting from such cutting for such distance, not exceeding forty feet, from the woodland of such other person, highway or railroad location as the local forest warden shall determine, and within such time and in such manner as he shall determine.

SECTION 2. Any person who cuts or causes to be cut trees or brushes or undergrowth within the limits of any highway or public road shall dispose of the slash and brush wood then and there resulting from such cutting within such time and in such manner as the forest warden of the city or town wherein such cutting is done shall determine.

SECTION 3. Whoever neglects to comply with the directions of the forest warden with regard to the disposal of slash and brush, as provided in sections one and two of this act may be punished by a fine of not less than five dollars nor more than fifty dollars.

SECTION 4. This act shall take effect on the first day of January in the year nineteen hundred and fifteen.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

TOWN.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimbursement.
Acushnet, . . .	1	10	16	-	-	-	4	1	-	-	-	2 ^{1, 3}	\$250 00
Ashburnham, . .	-	-	8	-	-	-	-	-	-	-	-	-	25 00
Ashby,	-	-	36	-	-	-	2	2	-	6	-	-	115 70
Ashfield, . . .	-	-	33	-	-	-	-	-	-	-	-	-	99 00
Ashland, . . .	-	12	10	-	-	-	12	6	-	6	12	-	77 91
Auburn,	-	-	83	-	-	-	-	-	-	-	-	-	249 00
Avon,	-	10	-	-	-	-	12	-	-	-	-	-	9 90
Becket,	-	14	16	-	-	-	-	2	-	-	24	-	79 50
Bedford, . . .	1	14	24	-	-	-	-	-	-	-	-	1 ²	249 67
Belchertown, . .	-	-	40	-	-	-	-	1	-	-	-	1	175 87
Bellingham, . .	-	16	23	-	-	-	6	-	-	8	-	1 ¹	122 92
Berkley,	-	36	24	-	-	-	-	-	-	-	-	-	162 00
Berlin,	2	10	38	-	-	1	12	-	3	12	-	1 ¹	241 45
Blandford, . . .	-	1	16	-	-	-	-	-	-	-	-	-	59 80
Bolton,	-	14	27	-	-	-	6	-	-	6	-	-	107 15
Boxborough, . .	1	12	30	-	-	2	-	-	3	4	3	1 ¹	182 80
Boxford,	-	-	16	-	-	-	-	-	-	-	-	-	45 60

¹ One-horse.² Two-horse.³ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT
ACT — *Continued.*

TOWN.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Boylston, . . .	-	-	66	-	-	-	24	-	-	28	-	-	\$243 61
Brimfield, . . .	-	10	30	-	-	-	-	-	-	-	-	-	99 75
Burlington, . . .	-	-	20	-	-	-	-	-	-	-	-	-	100 00
Carlisle, . . .	2	15	19	-	2	-	6	-	1	6	-	1 ²	247 72
Charlton, . . .	-	-	77	-	-	-	40	-	-	60	-	-	250 00
Chatham, . . .	2	15	11	-	2	3	4	-	3	5	-	1 ¹	152 98
Chester, . . .	-	37	15	-	-	-	-	5	-	-	12	-	97 02
Chesterfield, . . .	-	-	25	-	-	-	-	-	-	-	-	-	75 00
Cummington, . . .	-	-	12	-	-	-	-	-	-	-	-	-	64 50
Dana, . . .	-	-	6	-	-	-	-	-	-	-	-	-	18 75
Dighton, . . .	2	8	18	-	1	-	-	-	2	2	18	1 ¹	117 79
Douglas, . . .	-	25	50	-	-	-	-	-	-	-	-	-	175 00
Dunstable, . . .	2	25	10	-	1	-	4	-	3	6	6	1 ¹	106 14
East Longmeadow, . . .	2	-	18	-	2	-	12	1	-	4	-	1 ¹	153 96
Edgartown, . . .	2	5	10	-	2	3	4	-	3	5	-	1 ¹	152 17
Enfield, . . .	-	20	-	-	-	-	-	-	-	-	-	-	1 50
Erving, . . .	-	-	25	6	-	-	-	-	-	18	-	-	86 52
Essex, . . .	-	24	12	-	-	-	-	-	-	-	-	-	37 80
Florida, . . .	-	-	8	-	-	-	-	-	-	-	-	-	26 00
Freetown, . . .	-	24	20	-	-	-	-	2	-	72	-	-	167 48
Georgetown, . . .	-	30	54	-	-	-	-	-	6	12	-	-	194 08
Gill, . . .	-	5	20	-	-	-	-	-	-	-	-	-	65 00
Goshen, . . .	-	12	58	-	-	-	-	-	-	-	-	-	244 05
Granby, . . .	-	12	12	-	-	-	-	-	-	-	-	-	39 90
Granville, . . .	-	-	-	-	-	-	-	-	-	-	-	2 ¹	130 00
Greenwich, . . .	-	-	18	-	-	-	-	-	-	-	-	-	60 45
Groveland, . . .	-	6	12	-	-	-	-	-	3	12	-	-	51 05
Hadley, . . .	-	-	15	-	-	-	-	-	-	-	-	-	75 00
Halifax, . . .	-	12	64	-	-	-	12	-	-	18	-	1 ¹	241 91
Hampden, . . .	-	-	12	-	-	-	-	-	-	-	-	-	39 00
Hanson, . . .	-	6	24	-	-	-	6	-	-	5	-	2 ¹ , ³	250 00
Harvard, . . .	2	7	29	-	2	3	-	-	3	12	-	1 ²	250 00
Harwich, . . .	-	-	-	-	-	-	-	2	-	-	-	-	8 50
Holbrook, . . .	-	12	10	-	-	-	-	-	-	-	-	-	69 00

¹ One-horse.² Two-horse.³ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT
ACT—*Continued.*

TOWN.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Holland, . . .	-	-	8	-	-	-	-	-	-	-	-	-	\$25 00
Hubbardston, . .	-	-	52	-	-	-	18	-	-	4	-	-	175 75
Lanesborough, . .	-	5	-	-	-	-	-	3	-	-	36	-	26 50
Leverett, . . .	2	20	16	8	2	4	-	-	4	8	-	2 ¹	160 17
Leyden, . . .	8	10	4	9	-	-	-	-	4	4	-	-	22 35
Lunenburg, . . .	2	36	10	-	2	3	4	-	3	29	-	1 ¹	160 37
Lynnfield, . . .	-	35	20	-	-	-	-	10	-	-	6	2 ¹	249 95
Mashpee, . . .	-	-	22	-	-	-	-	-	-	12	-	1 ¹	124 80
Mendon, . . .	-	24	21	-	-	-	-	-	-	-	30	1 ¹	170 22
Merrimac, . . .	-	-	15	-	-	-	-	-	-	-	-	-	75 00
Middleton, . . .	-	-	16	-	-	-	-	-	-	-	-	-	49 50
Millis, . . .	-	-	8	-	-	-	-	-	-	-	-	1 ²	242 00
New Braintree, . .	-	-	37	-	-	-	-	-	-	-	-	-	120 97
Newbury, . . .	-	-	6	-	-	-	-	8	-	-	12	-	55 90
New Salem, . . .	-	55	20	-	-	-	-	-	-	-	-	-	100 50
Norfolk, . . .	-	-	18	-	-	-	-	-	-	-	-	-	99 00
North Reading, . .	-	-	38	-	-	-	-	-	-	-	-	1 ¹	248 43
Northborough, . .	-	-	25	-	-	-	-	-	-	-	-	-	102 37
Norwell, . . .	6	-	32	-	-	-	12	-	-	12	-	1 ¹	250 00
Oakham, . . .	-	12	30	-	1	1	6	-	3	3	-	1 ¹	222 97
Otis, . . .	-	5	10	-	-	-	-	-	-	-	-	-	62 50
Paxton, . . .	3	-	28	12	-	-	-	-	-	6	-	-	105 87
Pelham, . . .	-	-	19	-	-	-	-	5	-	-	-	-	84 12
Pembroke, . . .	-	-	31	-	-	-	60	-	-	-	-	1 ²	250 00
Petersham, . . .	2	10	36	-	2	3	4	-	3	5	-	1 ¹	248 05
Phillipston, . . .	-	36	38	-	-	-	-	1	-	-	-	-	130 15
Plainville, . . .	2	10	22	-	2	3	4	-	3	5	18	1 ¹	225 00
Plympton, . . .	-	-	-	-	-	-	-	12	-	-	-	-	20 93
Prescott, . . .	-	-	10	-	-	-	-	-	-	-	-	-	48 16
Princeton, . . .	-	32	80	-	-	-	-	-	-	-	-	-	249 20
Raynham, . . .	3	46	30	-	6	3	12	-	9	15	-	3 ¹	222 23
Rehoboth, . . .	-	10	48	-	-	-	-	-	-	-	-	1 ¹	250 00
Richmond, . . .	-	15	25	-	-	-	4	-	-	-	-	-	86 20
Rochester, . . .	-	24	60	-	-	-	-	-	-	30	-	-	205 37
Royalston, . . .	3	10	22	30	2	2	12	-	-	42	-	1 ¹	145 10

¹ One-horse.² Two-horse.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT
ACT — *Concluded.*

TOWN.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Russell, . . .	-	7	39	-	-	-	-	-	-	-	-	1 ¹	\$220 25
Rutland, . . .	-	12	18	-	-	-	6	-	-	-	-	1 ²	250 00
Salisbury, . . .	3	-	9	-	6	-	24	-	-	6	-	-	38 87
Sandwich, . . .	22	12	36	-	-	2	-	-	-	24	-	1 ¹	245 60
Shelburne, . . .	-	-	50	-	-	-	-	-	12	6	-	1 ¹	186 87
Shirley, . . .	-	48	36	-	-	-	-	-	-	-	-	-	139 50
Shutesbury, . . .	-	16	25	-	-	-	-	-	-	-	-	-	87 50
Southwick, . . .	-	12	26	-	-	-	-	-	-	-	-	1 ¹	101 50
Sterling, . . .	-	-	25	-	-	-	-	-	-	-	18	1 ²	241 12
Stow, . . .	-	-	42	-	-	-	-	-	-	18	-	-	131 31
Sturbridge, . . .	-	11	35	-	-	-	-	-	-	-	-	-	116 45
Sudbury, . . .	-	-	40	-	-	-	-	-	-	-	-	-	250 00
Sutton, . . .	-	50	50	24	-	-	-	-	32	24	-	-	188 46
Tewksbury, . . .	2	-	24	-	2	-	-	-	-	30	-	1 ¹	174 00
Tolland, . . .	-	-	-	-	-	-	-	4	-	-	4	-	18 26
Townsend, . . .	-	-	46	-	-	-	-	-	-	-	-	-	250 00
Tyngsborough, . . .	-	220	20	-	-	-	-	54	12	24	36	-	250 00
Tyringham, . . .	2	10	10	-	2	-	10	-	2	3	-	1 ²	112 30
Upton, . . .	-	-	30	-	-	-	-	-	-	-	12	1 ¹	235 28
Wales, . . .	2	-	40	-	2	2	-	-	-	-	-	1 ¹	236 77
Warwick, . . .	-	6	10	-	-	-	-	-	-	-	-	1 ¹	154 35
Washington, . . .	-	-	10	3	-	-	6	-	-	8	-	1 ¹	86 92
Wendell, . . .	-	38	27	-	2	-	12	-	-	18	-	1 ¹	163 24
West Boylston, . . .	-	-	107	-	-	-	-	-	-	-	-	-	250 00
West Bridgewater, . . .	-	-	20	-	-	-	-	-	-	-	-	1 ¹	200 12
West Brookfield, . . .	-	12	37	-	-	-	-	-	-	-	-	-	121 75
West Newbury, . . .	-	8	13	-	-	-	-	-	-	-	-	-	68 75
Westhampton, . . .	-	-	16	-	-	-	-	-	-	-	-	-	48 00
Westminster, . . .	-	77	48	24	-	-	24	-	-	24	-	-	244 09
Wilbraham, . . .	-	27	32	-	-	-	23	-	12	6	-	-	118 38
Wilmington, . . .	-	12	40	-	1	-	-	18	-	34	-	-	187 38
Windsor, . . .	-	-	40	-	-	-	-	-	-	-	-	-	200 00
Worthington, . . .	2	15	10	-	-	3	-	-	-	5	-	1 ¹	86 01
Wrentham, . . .	-	12	30	-	-	4	-	-	-	-	-	1 ¹	250 00
Totals, . . .	83	1,484	3,143	116	44	42	407	137	129	712	247	54	\$17,012 56

¹ One-horse.² Two-horse.³ Motor truck.

TOWNS RECEIVING FIRE-EQUIPMENT REIMBURSEMENT DURING YEAR 1914.

Acushnet,	\$106 78	Lanesborough,	\$26 50
Ashby,	81 20	Leyden,	22 35
Ashland,	60	Lunenburg,	11 09
Becket,	51 25	Lynnfield,	3 70
Belchertown,	4 25	Mashpee,	50 00
Bellingham,	9 75	Mendon,	80 22
Berkley,	18 00	New Braintree,	44 10
Bolton,	48 75	Newbury,	37 75
Boxborough,	2 34	Norwell,	6 13
Boylston,	167 41	Oakham,	32 12
Charlton,	28 63	Otis,	2 50
Chester,	97 02	Pelham,	7 50
Cummington,	64 50	Petersham,	45 50
Dighton,	9 12	Phillipston,	81 50
East Longmeadow,	4 25	Plainville,	41 50
Edgartown,	152 17	Southwick,	19 50
Enfield,	1 50	Tolland,	18 26
Essex,	37 80	Tyngsborough,	60 20
Florida,	26 00	Washington,	66 92
Georgetown,	59 25	Wendell,	128 17
Goshen,	122 32	West Newbury,	35 00
Granby,	90	Westminster,	1 87
Hampden,	39 00	Windsor,	50 00
Harvard,	48 48	Wrentham,	39 90
Harwich,	8 50		
Holland,	25 00	Total,	\$2,127 05

FOREST FIRES OF 1914.

MONTHS.	Number.	Acres.	Cost to extinguish.	Damage.
1913.				
December,	2	19	\$85 71	\$175 00
1914.				
January,	2	16	25 90	15 00
February,	1	1	1 80	10 00
March,	67	99	91 91	15 00
April,	857	6,929	5,768 22	17,554 00
May,	516	6,557	6,077 67	19,383 00
June,	298	2,258	4,699 64	6,144 00
July,	65	231	755 92	1,240 00
August,	41	827	460 96	518 00
September,	302	3,348	6,115 64	8,609 00
October,	821	17,412	22,079 41	38,141 00
November,	209	1,278	2,587 47	3,585 00
Totals,	3,181	38,975	\$48,750 25	\$95,389 00

TYPES OF LAND BURNED OVER (ACRES).

Timber,	3,001
Second growth,	9,016
Second growth, not merchantable,	7,943
Brush,	11,645
Grass,	2,510
Not classified,	4,860
Total,	38,975

TYPES OF CLASSIFIED DAMAGES.

Standing trees,	\$50,697
Lumber, logs and cordwood,	14,427
Buildings, bogs,	3,530
Bridges, fences,	331
Not classified,	26,404
Total,	\$95,389

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST FIVE YEARS.

YEAR.	Number of Fires.	Acreage burned.	Cost to extinguish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910,	1,385	42,221	\$23,475	\$205,383	30.46	\$148.29
1911,	2,536	99,693	47,093	537,749	39.31	226.24
1912,	1,851	22,072	20,219	80,834	11.92	43.67
1913,	2,638	53,826	35,456	178,357	20.02	66.35
1914,	3,181	38,975	48,750	95,389	12.25	29.98

CLASSIFIED CAUSES OF FOREST FIRES FOR THE PAST THREE YEARS.

CAUSES.	1912.		1913.		1914.	
	Num-ber.	Per Cent.	Num-ber.	Per Cent.	Num-ber.	Per Cent.
Unknown,	649	35.1	650	24.2	1,174	37.0
Railroad,	640	34.6	913	34.0	830	26.0
Burning brush,	93	5.0	148	5.5	196	6.2
Hunters and smokers,	223	12.0	386	14.3	520	16.4
Steam sawmills,	8	.4	6	.2	3	.1
Children,	79	4.3	109	4.1	140	4.4
Miscellaneous,	159	8.6	476	17.7	318	9.9
Totals,	1,851	100.0	2,638	100.0	3,181	100.0

PRECIPITATION IN INCHES FOR THE YEARS 1911, 1912, 1913, AND 1914,
WITH DECEMBER OF PREVIOUS YEAR.

MONTHS.	1911.	1912.	1913.	1914.	Normal.
December,	3.24	2.59	5.73	3.66	3.74
January,	3.07	3.87	3.21	4.30	4.12
February,	3.20	2.24	3.77	3.52	3.97
March,	3.27	5.26	5.32	4.20	4.34
April,	2.86	4.05	4.73	5.51	3.46
May, . . . . .	.89	4.03	2.85	2.95	3.37
June,	4.76	.53	3.20	1.75	3.07
July,	4.55	4.16	2.00	3.38	3.65
August,	6.70	3.85	3.30	4.59	3.70
September,	3.36	1.71	2.77	.45	4.36
October,	3.01	1.52	7.62	2.03	4.13
November,	5.71	3.45	2.70	3.06	3.96
Totals,	44.62	37.26	47.20	39.40	45.87

Our comparative tables on page 55 are very interesting, showing comparative fire losses for the past five years, comparative causes for the past three years, the number of forest fires by months, and the rainfall by months during the past year. Nearly 2,000 of our fires, classed as "unknown," "hunters" and "children," can be attributed to carelessness. It is certainly unfortunate in this enlightened age that pleasure seekers who are allowed the free use of the thousands of acres of forested area in the State will not use at least a little precaution when traveling through the woods, and not throw down lighted matches, cigarette stubs and cigar butts. We have had many prosecutions and convictions for violations of the fire laws, but it is almost impossible to convict the person who is traveling through the woods alone, as while we are satisfied in our own mind that he is the cause of the fire we have no evidence whatever that will convict him.

The permit law has been enforced quite generally throughout the State and is giving general satisfaction. Over 20,000 permits have been issued. While a few towns have not accepted this act I am in hopes that legislation may be enacted bringing all towns under its provisions.

Twelve thousand copies of the following fire notice, quoting extracts from the fire laws, have been posted throughout the forested area of the State:—



Spruce woodland, Cummington, Mass., before thinning.



Light thinning in spruce woodland, Cummington, Mass.

FOREST FIRES.

Your help is absolutely necessary if we are to prevent woodland fires. Do not throw down lighted matches, cigars, or cigarettes. Notify the nearest Forest Warden or Deputy in case of fire, and get busy yourself.

Good Citizens will be Cautious.

Others are hereby

WARNED

Setting fire to growing wood or timber of another.

Punishable by a fine of not more than \$100 or by imprisonment for not more than six months. R. L. 208, Sec. 7.

Letting Fire Escape.

Negligently allowing fire to escape from your own land to adjoining land. Punishable by a fine of not more than \$250, also liable for damages. R. L. 208, Sec. 8 and 9.

Permit necessary.

A permit must be procured from the Town Forest Warden for all fires in the open air between March 1 and December 1, except as provided in Sec. 1, Chap. 244, Acts of 1911. Penalty for violation, not more than \$100 fine or imprisonment for not more than one month, or both such fine and imprisonment.

Penalty for Refusing Aid.

Any person between the ages of 18 and 50 years who refuses, without good cause, to assist the Forest Warden or his Deputies in the fighting of forest fires is liable to a fine of not less than \$5 or more than \$100. R. L. 32, Sec. 21; 1907, 475, Sec. 3.

Auto Parties.

Picnic Parties.

Hunters and Campers.

All persons visiting the forests will be held responsible for any damage they may cause.

F. W. RANE, State Forester,
_____ Forest Warden. 6 Beacon St., Boston, Mass.

Posted by authority of Acts of 1907, Chap. 475, Sec. 2.

We have experienced considerable trouble with fires just over the town line this year. While we have made improvement along this line during the past three years we still have town officials who refuse to go into an adjoining town and extinguish a small fire, preferring to let it burn up to the line and then endeavor to extinguish it. I feel that our district wardens will in time overcome this jealousy between towns, so that we shall not then have these serious town line fires.

The power sprayers in use by many towns in the suppression of the gypsy and brown-tail moths have demonstrated their value at forest fires, possibly more along the North Shore than in any other portion of the State. During the months of September and October one was located at Beverly, one at Essex and one at Manchester. These were at the disposal of the forest wardens in these towns, and were brought into use at several fires. At a turf fire in Beverly two of them were in use for several days and did very effective work.

As our appropriation for forest-fire protective work is only \$23,000, we have not been able to do as much construction work as we had desired to, but we have made it a point to erect substantial, permanent observation towers in each instance. These towers are all set on cement abutments which go below frost line, and all that is now required, that they may last for years, is painting once in three years. Nine of them have been painted this year.

We are asking for an increase of \$7,000 in our appropriation this year, making a total of \$30,000, which is absolutely necessary if we are to complete our construction work and maintain the present forest-fire policy. It is important that each of the four district wardens be furnished with a suitable truck properly equipped with fire-fighting apparatus, which may be held in readiness for use in case of emergencies. This would enable them to take on ten or more trained fire fighters and go to any serious fire. The above appropriation would allow the purchasing of at least two this year. The importance of such a truck was demonstrated at a fire on Sugar Loaf Mountain, New Ashford, which, after burning thirty-six hours, had assumed such proportions that it was practically beyond control. Owing to the serious fires burning west of the Connecticut River we had shipped to our district forest warden a supply of equipment for his use. This equipment, consisting of pumps, extinguishers, etc., was loaded on an automobile at 10 o'clock at night, and a 40-mile run was made to New Ashford, the district man arriving there about 2 o'clock in the morning. At 7 o'clock that morning 30 men were at work with the equipment on the fire, and before night the fire was under absolute control. This is but one case in many where the town had absolutely no equipment, and without a doubt this fire would have burned over a large area of the Greylock Reservation if assistance had not arrived at that time. This shows the importance of having equipment, with ways and means of getting to disastrous fires. While many of our towns have sufficient equipment for handling ordinary fires, it is an impossibility for them

to cope with large ones. It therefore seems necessary, if we are to lessen the damage caused by our large fires, that our four district men be provided with suitable apparatus and means of getting it to a fire if the efficiency of their service is to be increased to a maximum.

In conclusion, I desire to express my appreciation of the loyal and hearty co-operation of all employees in this branch of the service.

Respectfully submitted,

M. C. HUTCHINS,
State Fire Warden.

CHESTNUT BARK DISEASE.

This disease, which was mentioned quite fully in last year's report, still continues to spread throughout the State, and at the present time is to be found to a greater or less degree in nearly all places where chestnut is growing. Regardless of the fact that both government and State men have given much time and effort to combat this very virulent tree disease, little has been learned during the past year that would tend to solve the problem of eliminating the disease without eliminating the chestnut trees on an extensive scale. Mr. Roy G. Pierce, the expert on chestnut blight who was connected with this office until July 1, 1914, covered the State quite thoroughly, making examinations, giving advice and lectures, and disseminating knowledge generally in regard to the disease and its workings, so that most woodland owners have at present a very fair idea of what the disease is like.

Clean cutting of all infected specimens is recommended where the disease occurs in woodland areas, and a certain amount of spread can be checked if the trees infected are cut when the cankers first appear rather than after they have girdled and killed the trees completely.

STATE HIGHWAY PLANTING.

At the request of Mr. Pillsbury, division engineer of the Highway Commission, we undertook a piece of work on a line which we have never undertaken extensively before, namely, setting out trees on the highway. After looking over several possible situations it was decided to do the planting on the State road between Ipswich and Newburyport. Eight hundred trees were set out in all, on a stretch of road 10 miles in length,

at a cost, including the trees, of about \$900. The following species and number of trees were planted: Norway maples, 400; white ash, 250; pin oak, 50; linden, 50; oriental plane, 50. Three hundred of the trees were staked, but guards were not put on them, as they stand on a road in the country, and few of them are near houses. The cost analyses are approximately as follows: —

	Per Tree.	Total.
Cost of trees,	\$0 45	\$356 50
Labor of planting,	40	318 00
Transportation,	10	80 00
Staking materials (300 trees),	10	32 00
Supervision,	04	30 00
	\$1 09	\$816 50

MUNICIPAL FORESTS.

It is believed that the time is ripe for many of our Massachusetts towns and cities to make a beginning in establishing a municipal forest. Already a few towns and cities have made a start in the right direction by planting the areas about their source of water supply, but why stop with this when there are in most instances available cheap lands that either already belong to the town or city or can be purchased at a low price. The great good to come from such an enterprise as this can only be appreciated when we take into account the experiences of the municipal forest propaganda of the old world. They have succeeded and our chances for success are even greater. If this office can be of any service to any city or town in establishing a municipal forest, we certainly shall consider it a pleasure to serve you. The Massachusetts Forestry Association of 4 Joy Street, Boston, is sending out some very interesting information on establishing municipal forests, and is also offering prizes to cities and towns which make the best showing.

SPECIAL CO-OPERATIVE MOTH WORK.

During the past season the general co-operative work, similar in many ways to that carried on heretofore with the North Shore people, has been executed in several places. The North Shore work is so well in hand, we are happy to report, that the expenditure has been greatly reduced the past season, and we hope to see still further curtailment the coming year, with equally good results.

The town of Dover entered into similar co-operative work over a year ago, and at present the results are extremely satisfactory. It was simply a case of doing the work properly and in time.

Some very effective work has been done in co-operation with those owning cottages about Lake Boon, and at present several undertakings are under way which are being entirely financed by individuals, corporations and municipalities.

MOTH AND FOREST SURVEY OF WINCHENDON

As was slightly alluded to in last year's report, relative to making the town of Winchendon a "Black Forest" town, co-operative plans were agreed upon with Dr. L. O. Howard, representing the United States Department of Agriculture, and Mr. Ralph Zon of the United States Forest Service, whereby a thorough survey of the town was made. This report was submitted and explained to the townspeople at a public meeting called by the selectmen recently. A committee of three citizens was appointed at this meeting to confer with the State and government authorities for further consideration and recommendations.

The goal aimed at is to remove all trees that are the natural food plants of the gypsy and brown-tail moths. This logically carried out will give way to a large acreage of evergreen growth, particularly of white pine and spruce, which are of greater ultimate value. Already the town is well stocked with pine, and it is believed that an experiment on such a large scale — 29,000 acres — will be of great value not only to the town itself, but to the State and, in fact, to New England.

It is to be hoped that something definite can be undertaken, as the experiment will be valuable not only in eliminating future moth troubles, but in establishing a coniferous forest on an extensive scale, which economically and æsthetically would prove of great interest.

MOTH WORK IN BOSTON.

When the moth-suppression work was placed under the supervision of the State Forester in 1909 the city of Boston was one of the worst infested districts in the State. The city up to that time had not attempted the work of suppression on a scale sufficient to make any permanent impression upon the insects, and the State had taken the attitude that the funds were not sufficient to be able to compel the city to do what the law requires. With these conditions, it inevitably followed that the trees were stripped bare of their leaves in various sections, and a great many trees died that might have been saved.

The following year, in 1910, this department began a systematic campaign of co-operative work with the city, and that work has progressed until at the present time we are happy to announce that the Boston trees are being as well cared for as any, and that hereafter the State's financial assistance will be relatively small if any. During the past five years the reimbursement from the State to Boston has been \$82,000, and the city has also been at a very heavy expense. Now that the city superintendent, Mr. Wm. F. Long, has the work well in hand with modern spraying equipment, and a corps of trained men, this work should henceforth be kept up to its present standard at relatively small expense. It certainly would be suicidal to allow any indifference to creep in that would tend to lessen this work in Boston in the future. Trees are certainly one of Boston's greatest assets, and now that the conditions are so favorable, it is to be hoped that all Bostonians will uphold the work of Mr. John H. Dillon, chairman, Park and Recreation Department, and Mr. Wm. F. Long, the moth superintendent.

It is with pleasure that I publish the following report of Mr. Long, which points out more in detail Boston's present condition: —

DEC. 19, 1914.

DEAR SIR: — In response to your request for a report of the state of the gypsy and brown-tail moth infestations in the city of Boston, including Hyde Park, I would say that up to the present date conditions have been improved about 80 per cent. since we first commenced the suppression work. During each of the last two years we have been able to cover entire city and have had no defoliation. In the past year, particularly, we have made such good headway that we are considering the advisability of doing away with winter destruction and depending entirely upon the spraying treatment.

The woodland conditions of Boston are very good — infestations by gypsy moths very light, brown-tail moths, hardly any.

Hyde Park, which was so badly infested, is in excellent condition at the present time; so, also, are the woodlands of Dorchester and West Roxbury. Charlestown has no gypsy infestations and a very light brown-tail moth annoyance. East Boston has practically no moth troubles, Boston proper has a very light brown-tail infestation. South Boston has light quantity brown-tail but no gypsy disturbance. Conditions in Roxbury are similar to those prevailing in South Boston. Brighton has very light infestations of both gypsy and brown-tail moths. Jamaica Plain and Forest Hills sections have very light gypsy moth infestations. Dorchester has a light general infestation of gypsy, but very few of brown-tail moths.

A section of our parkway has a bad infestation of gypsy moths, but it can be handled easily. It seems as if all the caterpillars in the neighborhood selected this particular season.

During this past year we have been able to do considerable tree work, cutting out, cementing cavities, etc. The cement work was done principally in the East Boston section, but the removal and pruning was done liberally all over the city, also the roadside work.

Very truly yours,

WILLIAM F. LONG,
Foreman.

MOTH WORK IN BROOKLINE.

The town of Brookline has always been ready and willing, not only to co-operate in the moth-suppression work, but has always paid for all expenditures made in the town, although the town could have come under the reimbursement head. Both the moth superintendent, Mr. E. B. Dane, and the

deputy, Mr. Daniel G. Lacy, have put the proper spirit into the work, and they have had a large territory to cover. It is believed that the following report of the work in this town will be of interest:—

BROOKLINE, MASS., Dec. 18, 1914.

DEAR SIR:—The following is a report of the condition of the town of Brookline relative to the gypsy and brown-tail moth situation. This past year the sum of \$21,000 was appropriated by the town for insect work on the roadside trees and for private property.

Last winter we had a serious infestation of brown-tail moths, but from January to the middle of March we covered the town and removed the nests. The gypsy moth situation last winter was rather a scattered infestation. This past summer all the roadside trees in the town, about 65 miles in all, were carefully sprayed, and private property which was infested. A recent examination shows us more egg clusters of the gypsy moths in isolated cases than last year, but on the whole the situation is improved.

During the coming winter the entire town, including both roadside and all private property and woodland areas, will be carefully creosoted, and sprayed next spring.

We have very few brown-tail moths this year, and so far in our winter work, covering a period of five weeks, we have not found more than 100 nests of this insect. Last spring we had a considerable number of both varieties of the tent caterpillars, but prompt spraying remedied this condition.

In our recommendation to the town for the ensuing year the amount to be asked for will be larger than this past year, owing to the increase in wages paid, and acceptance by the town of the act giving the employees two weeks' vacation.

The moth situation in Brookline is well under control, as will be shown by the fact that the past two years we did not receive a single complaint on the defoliation of any tree in the town.

Respectfully submitted,

DANIEL G. LACY,
Superintendent.

MOTH FIELD DAY IN LINCOLN.

On July 7 a field day was held in Lincoln on the estate of Gen. Charles Francis Adams. This splendid estate comprises upwards of 600 acres, a large portion of which is covered with forest growth. This estate afforded one of the best opportunities to demonstrate moth-suppression work, as it contains a great variety of conditions. One of the finest so-called primeval growths of white pine is found here, while on other sections of

the estate some magnificent specimens of oak and chestnuts can be seen. Mr. Adams has been reforesting and underplanting, as well as thinning and carrying on general forestry management, for several years.

Before the moths began to be destructive in Lincoln Mr. Adams conferred with the State Forester, and co-operative work was undertaken. He has a modern spraying equipment, and was able, through modern methods, to retain the foliage on his trees while adjoining properties have been in most cases stripped.

In order to facilitate matters, and call attention to the varying methods and conditions, placards were posted at various places over the estate, and a printed program explained each.

The State Forester wishes here to acknowledge the splendid interest that Mr. Adams has shown in this work, and to thank him in behalf of the Commonwealth for his hospitality on this occasion, as even the delicious luncheon for all attending was furnished by him.

PROTECTING AND INCREASING BIRDS.

There is an increasing interest on the part of our people in doing what we can to encourage the bird life of our State, and this is commendable. Trees and birds are closely associated in the minds of all naturalists. State and national laws are being enacted to regulate wild life generally, and none are more interested in this work than foresters.

The birds are the guardians of our forest and shade trees and the orchards of the farmer. They are eternally waging a relentless warfare upon the insect hosts that prey upon the foliage, fruit and even the trunks and branches of the trees. In return for this safeguarding the trees themselves offer their hospitable branches as nesting sites for the birds, and stretch over them a canopy of green as a shelter from the oppressive rays of the sun and as a protection against the downpour of rain.

Some species of birds do not build nests among the branches, but excavate holes in the decayed trunks and branches of trees, and still others, not able to excavate homes for themselves, use these vacated apartments of the woodpecker family, and also

the nesting boxes offered by their human friends. All of the birds having this nesting habit are of the most beneficial species, from the fact that their food is composed largely of insects, and we should in every possible manner encourage their numbers to increase.

Dead trees and decayed branches are a menace to the health of the forest, and are removed by the forester, who at the same time unwittingly destroys the future nesting site of a woodpecker. In order to provide nesting places, and at the same time promote the welfare of the forest by eliminating these plague spots of beetle and fungus, we must place in open spots, and along the borders of the woods, nesting boxes.

It is the purpose of the State Forester to interest woodland owners and others in building bird houses, or purchasing them from reliable dealers, and seeing that all localities take some part in this fascinating work. Mr. Bradford A. Scudder, secretary of the Massachusetts Fish and Game Protective Association, gives us the proper dimensions and descriptions necessary to build various kinds of bird boxes. Mr. Scudder and his association are very active in the work of caring for birds, having distributed tons of food for them in winter and offering for sale at small cost bird boxes of all kinds, etc.; hence the data which follow are reliable:—

The proper inside dimensions for nesting boxes for the following species are as follows:—

Bluebird. — Depth of box, 10 inches; floor, 5 by 5 inches; entrance, $1\frac{1}{2}$ inches; lower edge of entrance, 7 inches above the floor.

Chickadee. — Depth of box, 10 inches; floor, 4 by 4 inches; entrance, $1\frac{1}{4}$ inches; lower edge of entrance, 7 inches above the floor.

Flicker. — Depth of box, 20 inches; floor, 6 by 6 inches; entrance, $2\frac{1}{2}$ inches in diameter; lower edge of entrance, 16 inches above the floor.

Tree Swallow. — Depth of box, 7 inches; floor, 5 by 5 inches; entrance $1\frac{1}{2}$ inches in diameter; lower edge of entrance, 4 inches above the floor.

The four species enumerated above are the ones most likely to occupy the nesting boxes, for they are found in large numbers throughout Massachusetts. The white-breasted nuthatch and the house wren are not as abundant as the birds just mentioned, but nevertheless each of these should be offered a

home. The bluebird box will suffice for the nuthatch, and that of the chickadee for the wren.

Pine lumber seven-eighths of an inch in thickness, planed on one side only, is good material to use in the construction of these boxes. The rough side of the board should form the inside of the box. Stain the outside, only, a neutral tint of brown or gray. The entrance hole in each instance is circular, and should be cut with an extension bit, which is easily set for the varying size of entrance. Cut the entrance on an upward slant, rather than at direct right angle with the surface. This prevents the rain from driving in, and also simulates the doorway of the woodpecker architect, whose work we are copying. The roof should project an inch and a half in front, but be flush with the sides and back. The top should be removable, so that at the end of the season, after the departure of the birds, the box may be cleaned and any egg clusters of moths that are sometimes deposited there destroyed.

Each nesting box should have a layer of coarse, dry sawdust to the depth of 2 inches placed in the bottom. This is an important detail and should not be overlooked, especially in the box designed for the flicker.

Nesting boxes may be fastened to the trunk of a tree, or one of its large branches, care being taken that no intervening branches will prevent an easy ingress and exit by the occupants of the box. About the borders of fenced land boxes may be fastened to the tops of light poles, 12 feet in length, and these poles may then be fastened to posts in the fence, using lag screws or heavy wire spikes for the purpose. Tree swallows and bluebirds will tenant these boxes and gather their food from the insect hosts of field and orchard.

Do not place the boxes too near one another. Birds of the same species are apt to dispute ownership, so let a space of at least 200 feet intervene between the boxes.

Bird boxes should be placed at a height of not less than 8 or more than 20 feet above the ground. Boxes for the chickadee and house wren may be placed at the first-mentioned height, but for all others a height of at least 15 feet is better.

Bird boxes should have the entrance face the south or southwest, thus preventing the beating in of rain during violent,

cold, northeasterly storms that frequently occur during the nesting period.

In placing the nesting boxes in position, have them as nearly vertical as possible. Should they incline at all, let them tip slightly forward rather than backwards.

Boxes designed for bluebirds and tree swallows, and placed in the open where they are exposed to the full glare of the sun, should be painted white, and also have a few quarter-inch holes bored in the sides, about an inch below the top, for ventilation.

Wood is the only suitable material for the construction of nesting boxes, and boards are obtainable anywhere throughout this land of ours, so that by following the above instructions the farmer, the schoolboy and the commuter may construct a bird house that will be accepted by the birds, and at the same time enjoy both the pleasure and the satisfaction of doing the work himself.

Placing the nesting boxes in position after completion does not complete the responsibility of the landlord. The farmer plants corn, but in order to reap a harvest he must remove the weeds that spring up. The same applies to the bird houses. Without watchfulness on our part they will be pre-empted by English sparrows and squirrels, and an unceasing warfare must be waged upon these pests. Number your bird houses and keep a record of the number and kind of species that use them during the season. Numbers may be placed at the foot of the tree or pole upon which the box is placed, or on the bottom of the box itself.

The insect that birds seem to care the least about, unfortunately, is the gypsy moth. Many observations and experiments have been made with a purpose of determining to what extent birds can be depended upon to aid in the control of this insect. It is generally conceded, however, that the gypsy moth is so hairy and, in fact, bristly during its larval stage, when the birds would naturally seek it for food, that it really is objectionable and distasteful to them.

One of the insects that at the present time is very destructive, especially to our shade trees, is the leopard moth. This insect develops into a large, fleshy, boring larva which lies in the branches or trunks of the trees, and the woodpeckers are

our best assistants in devouring them. These birds should be encouraged as much as possible.

There has been much concern in the past about the effect of spraying with arsenate of lead upon bird life, but after a careful study of the subject by Mr. Forbush, the State Ornithologist, he became convinced, as published in his report of 1909, that spraying was a benefit rather than a hindrance to bird life. Where the trees are not sprayed, and defoliation takes place, the birds are the first to leave. Where the foliage is retained by spraying, thus giving shade and protection, here birds are found in large numbers.

For further information on bird-house construction the reader is referred to Farmers' Bulletin No. 609, United States Department of Agriculture, Washington, D. C. This bulletin is sent free upon application and is very valuable.

A new handbook, "The Conservation of our Wild Life," published by the Massachusetts Fish and Game Protective Association, price 35 cents, treats on methods of attracting and increasing our useful birds and the establishment of sanctuaries.

For detailed information on birds in general, of course the reader is referred to Mr. E. H. Forbush, the Massachusetts State Ornithologist, Room 136, State House, Boston, Mass.

After writing the above the following letter was received from Mr. E. C. Ware, Wareham, Mass., which explains itself:—

DEAR SIR:—I have some new circulars in the printer's hands at the present time. Boxes now made are for flickers, bluebirds, swallows, wrens and chickadees, and I intend to start on martin boxes in the near future. Price is 35 cents for all boxes except the flicker box, which is 75 cents. All boxes are complete, ready to put up, and stained with a brown oil stain. Twenty-five or more boxes in one order can allow a discount of 25 per cent. Roofs of all boxes are covered with a good grade of roofing paper over the wood, and the entrance hole is faced with zinc to keep the squirrels from doing injury to the box.

THE ARMY WORM OUTBREAK.

One of our native insects which at times appears so abundantly as to be regarded by the farmer and agriculturalist as an extremely dangerous pest, and one against the ravages of which prompt and vigorous action should be taken, is the army worm, *Heliophila unipuncta*. This insect is found from

the Atlantic Ocean to the Rocky Mountains and from Canada to Texas. Fortunately, serious outbreaks of this species are not frequent in Massachusetts.

Beginning about the middle of July, 1914, the State Forester's office began to receive, through the mail and otherwise, many specimens of this insect sent in by citizens from several sections of the State for identification. The large number of insects thus received, together with the receipt of many letters describing it, made it obvious that the State was suffering from an invasion of the dreaded army worm.

On July 28 His Excellency Governor Walsh, recognizing the importance of adopting remedial measures to relieve conditions, addressed to the State Forester the following letter:—

MR. F. W. RANE, *State Forester, 6 Beacon Street, Boston.*

DEAR MR. RANE:—My attention has been called to the fact that serious injury is being wrought in various sections of the Commonwealth by the presence of the army worm, which is attacking and destroying crops.

I am of the opinion that your department, acting in co-operation with the Board of Agriculture, should at once request a sufficient number of your local moth superintendents to advise with farmers and others in the communities affected as to the best means of suppressing this destructive pest.

I understand the State Board of Agriculture and your own department have already sent out a large number of notices containing instructions, but it would seem that the situation now would require the employment of active agents in the various sections.

In view of the fact that you have no funds available for this work, I am convinced that this is such an emergency that would justify my asking the Executive Council to supply the sum of money necessary to direct the work of suppressing this pest.

I would also suggest that spraying apparatus owned wholly or in part by the town, or jointly with the State, should be brought into use as far as possible in carrying on this work.

In conclusion, I would also ask that the gypsy moth field agents and inspectors employed by your department be given instructions to aid and co-operate with the local moth superintendents in the infested areas. I would suggest that the widest publicity be given to the presence of the army worm in the Commonwealth, because it is a well-known fact that if precautions are taken the harm and injury wrought by this pest can be minimized.

Yours very truly,

DAVID I. WALSH.



Fighting the army worm. One of the simplest and most effective methods of checking the spread of the army worm is to plow a furrow in advance of their march. They fall into this trench and are unable to get out. Taken at Bridgewater, Mass.

Upon receipt of the above letter the State Forester caused a circular letter to be sent to the mayors of cities and selectmen of towns, informing them of the purpose of the Forestry Department to co-operate with them in suppressing the pest. The form of the letter follows: —

GENTLEMEN: — By request of His Excellency Governor Walsh, this department will co-operate with cities and towns in suppressing the so-called army worm, which in some sections of the State is causing serious damage to crops. Local superintendents will be asked by this department to aid property owners in suppressing this insect. If it is found necessary to incur any expense in carrying on this work such expense will be borne by the Commonwealth. Local superintendents have been advised by agents of this department that all bills, after being approved by the division superintendent, must be forwarded to the office of the State Forester. It is distinctly understood that no part of such cost shall be borne by the city or town wherein the work is performed.

Very truly yours,

F. W. RANE,
State Forester.

Instructions were immediately given to the State field agents, employed in the gypsy and brown-tail moth work, to render to cities, towns and private owners within their respective districts all possible aid in the work of extermination.

The thorough training of the gypsy moth men in insect-suppression work, and the fact that the moth department of each city and town is well equipped with spraying apparatus, made it possible to apply quickly and effectively the necessary measures of suppression. The presence of the army worm was reported to the State Forester's office from the following-named towns: —

Abington.	Brockton.	Fairhaven.
Arlington.	Carver.	Fall River.
Athol.	Chatham.	Falmouth.
Attleboro.	Chelmsford.	Gloucester.
Barnstable.	Cohasset.	Halifax.
Berkley.	Dartmouth.	Hanover.
Boston.	Dighton.	Hanson.
Bourne.	Duxbury.	Harvard.
Braintree.	East Bridgewater.	Harwich.
Brewster.	Easton.	Hingham.
Brighton.	Edgartown.	Holbrook.

Longmeadow.	Oak Bluffs.	Somerset.
Mansfield.	Pembroke.	Taunton.
Medford.	Plymouth.	Tisbury.
Middleborough.	Plympton.	Topsfield.
Milford.	Raynham.	Wareham.
Nantucket.	Rochester.	West Boylston.
Newbury.	Rockland.	West Bridgewater.
North Andover.	Rockport.	Weymouth.
Northbridge.	Salisbury.	Whitman.
Norton.	Scituate.	Worcester.
Norwell.	Seekonk.	

STATE FORESTER'S EXHIBIT AT THE PANAMA-PACIFIC EXPOSITION.

An appropriation of \$3,000 was made this department by the Board of Managers for Massachusetts for making an exhibit at San Francisco. This has been spent in getting together the following material:—

(1) A large relief map of the whole State in which the forest and agricultural areas are shown. The forest-fire lookout stations are all located on this map by miniature towers; also the various State and private reservations are painted in. The State Forester was fortunate in securing the services of Mr. Warren Manning, landscape architect, of Boston, who had full charge of the construction. This map is 15 feet long by 6 feet wide, and is the exact size of the United States geological maps. This map will prove of great value after the exposition is over, as it can be used for many purposes by this department.

A duplication of this map was also made for the State Board of Agriculture, which has been colored to show the lands adapted for general agriculture in contrast to the present conditions as shown on the forestry map. The two maps are to be in adjoining booths at the exposition, which will add to their value.

(2) A fully equipped Massachusetts forest-fire wagon, similar to those used in our towns.

(3) A miniature steel lookout station of our own design.

(4) A large-sized, fully equipped power sprayer, a facsimile of those constructed and used in the moth work in Massachusetts.

(5) Two cases of colored transparencies, each containing 48 pictures, showing Massachusetts forestry and moth conditions and work. These pictures are each 8 by 10 inches in size, and electric fixtures are so arranged that the artificial light brings out their coloring.

(6) Several large sketches of typical Massachusetts scenery painted in colors by Mr. Manning will be used on the wall space.

(7) Various maps and placards, showing forestry data, publications, etc.

This material is all of such a nature that it can be used in this department when the exposition is over.

NATIONAL ASSOCIATION OF CONSERVATION COMMISSIONERS.

The State Forester was elected secretary of this association at its meeting in Washington, D. C., in 1913, and the annual meeting this year was held at New Orleans, La., at the invitation of the State Conservation Commission of Louisiana. The meetings were held at the St. Charles Hotel, New Orleans, from Monday, November 16, to Thursday, November 19, after which the Louisiana Conservation Commission extended invitation to the delegates for a trip to the mouth of the Mississippi River, where an exceptional opportunity was offered to see and study wild life and the fish and oyster industries of the section.

The subject, "Forests as Nurseries of Wild Life," was the topic on the program discussed by the author. The subject of wild life, and the importance of national and State laws regulating the same, particularly in the case of migratory birds, was given due consideration.

THE MASSACHUSETTS STATE FOREST POLICY.

Each year has seen a gradual step forward in our forestry work in Massachusetts, until sufficient fundamental legislation has accumulated so that it is not boasting, it is believed, to say that we now have in this State a well-rounded-out forest policy. It was with the idea of calling attention to this fact that the State Forester prepared and delivered the following

paper before the Society for the Promotion of Agricultural Science, which held its annual meeting at Washington, D. C., on Nov. 10, 1914, a copy of which is as follows:—

THE MASSACHUSETTS STATE FORESTRY WORK.

It is believed that we are still woefully lacking in the United States in being unable to show more results from the practice of modern forestry. In analyzing the situation it cannot be attributed to lack of enthusiasm and willingness on the part of the men in the profession. For some reason the owners of the larger tracts of forest lands seem interested, but non-active, and real operating lumbermen change their methods relatively slowly. Public, national and State undertakings in forestry, from the standpoint of constructive and businesslike methods, seem to be lacking in vigor. Lack of funds to do with would appear to be the trouble; but why should this be, if the investment will warrant the expenditure? I believe the greatest weakness in forestry at present is the lack of stalwart men able to convince our Legislatures, business corporations and men of affairs of the great importance of doing something on a much larger and more comprehensive scale than we have yet accomplished. Planting a thousand or two trees, or thinning and practicing modern forestry methods on a 5-acre tract here and there, are but drops in the bucket as compared to what ought to be undertaken in forestry in our various States and throughout the nation. Had we attempted to dig the Panama Canal under the same momentum that we are practicing forestry to-day, it is questionable if it would ever have been completed; we, however, are allowing our lands adapted for splendid forest crops to lie idle, and worse than that, not even forest fires are kept under control.

Up to the present time most American foresters have looked wise, given a great deal of advice, written pamphlets and books, and kept up a very good propaganda of forestry interest, but we have still, it is believed, a great lack of results that will come only when the fundamental problems have been given deeper root.

In calling attention to the work in forestry in Massachusetts I preface my remarks thus because it has not been a question of object lessons, examples and demonstrations to follow, but a working out of our State system by our own efforts.

Before the States began to have foresters, the United States Forest Service offered advice and assistance throughout the nation. During this time many examinations and recommendations by experts were made for Massachusetts people, but strange to say, when these same documents were checked up for results later it was found very little had been accomplished. The work on behalf of the forest service was well executed, and the owners were evidently interested in the beginning, but the work failed to be carried out simply because it was not followed up and kept alive by further personal contact. One thing has been conclusive thus far in our experience in Massachusetts, and that is, if anything tangible

is to result in forestry work it must first be demonstrated by technical men right in the State; then our farmers and lumbermen will know we are advocating what can be accomplished from actual experience. The more real and definite examples a State forester can have scattered about his State, the sooner will he be able to make headway toward bettering general forestry conditions. Object lessons not only educate, but encourage action.

During the past eight years, year by year, through kindly consideration and definite legislation, the members of our General Court, enthusiastically headed by our public-spirited Governors, have given us statute after statute, until I am pleased to say I believe we now have a thoroughly well-rounded-out Massachusetts State forest policy. I am frank to say that I know of no State in the Union wherein the individual who cares to practice modern forestry can get more co-operation on the part of the State than in Massachusetts. While it is not the State's policy to actually give anything away, we nevertheless are so solicitous over ultimate success that we are doing everything possible to encourage our people to practice modern forestry.

I do not care to weary you by citing all of our various laws which are the foundations of our State forest policy, as they can be had in their printed form, but I do wish to point out briefly what is being done for forestry in Massachusetts.

(1) Expert forestry services are given at no expense, except travel and subsistence, to anybody in Massachusetts. Blank forms for requesting such assistance are available from the State Forester's office, Boston.

(2) In addition to expert advice, the State Forester's office has published, for free distribution, bulletins on the subjects of chief interest, as follows: —

Forest Thinnings.
Reforestation and Nursery Work.
Mensuration of White Pine.
Forest Fire Control and Management.
The Chestnut Blight Disease.
What is Forestry.
How and when to collect White Pine Seed.
Forest Taxation, etc.

(3) *Organization.* — The State Forester has general supervision. He is given trained assistants in the various branches represented in State work. The assistant in forest-fire work is given the title of State Fire Warden. Each town and city in the State has an officer known as forest warden. This officer is appointed by the officials of the town or city, and his appointment is subject to the approval of the State Forester. The local forest warden is clothed with enough power to get results in his jurisdiction. Some of his powers and duties are as follows: —

(a) No warrants can be paid for fighting forest fires without his approval.

(b) May compel any citizen between the ages of eighteen and fifty-one

to assist in fighting forest fires, or may compel the use of teams and implements of another for similar use.

(c) No fires are set out of doors from March to December without a permit from him.

(d) The power to arrest without a warrant where persons are caught setting fires.

(e) Appoints his deputies.

(f) Has charge of local forest-fire apparatus.

(g) Pastes forest fire notices.

(h) Has responsibility of controlling brush and slash disposal.

(i) Gives assistance to assessors when called upon to secure data for forest taxation.

The State is divided into four parts, and each of these divisions is looked after by a so-called district forest warden. This man is appointed by the State Fire Warden, and is supplied with a runabout auto. It is the duty of the district forest wardens to supervise the work of fire protection within their respective districts. They have charge of the observation stations within their districts, receive reports from the observers each week, and are at all times subject to the call of each observer to attend any disastrous fire. They shall visit all towns within their districts, instructing the town forest wardens and deputy forest wardens relative to their duties, making such recommendations as in their judgment will improve the service. They shall inspect all forest fire-fighting apparatus, seeing that the same is in perfect condition and in readiness for an immediate response to an alarm of fire. They shall visit the selectmen of the different towns, advising them as to the necessity of properly providing their towns with forest fire-fighting apparatus. They shall report the number of each locomotive operating in their district not properly equipped with spark arrester, as required by law, and whose ash pan and grate are not sufficiently protected from setting fires. They shall submit to this office a weekly report showing the work accomplished by them each day, and shall report to this office any inefficiency or neglect of any observation man, forest warden or deputy.

The surface of the State of Massachusetts is of a rolling nature and particularly well adapted for fire lookout stations, by utilizing its higher hills and mountains. During the past three years 26 of these stations have been in operation throughout the State. At first improvised towers were used, but now substantial ones of steel construction ranging in size from 40 feet high, which is the standard, to 75 feet. The accompanying map indicates their distribution over the State.

The position of observer on the lookout station is the most important position under our present forest fire system. The future preservation of the forests of the State of Massachusetts depends largely on the men in charge of these stations. If they are alive to the situation, and appreciate the importance of the position they hold, disastrous fires within this State will be eliminated.

Each observer has under his supervision over 400,000 acres of land, a

large percentage of which is valuable forest land. He is equipped with a field glass and the best map that can be obtained, and has the names and telephone numbers of every town forest warden and deputy forest warden within his territory. There has also been placed in each station a time-clock, to be punched every half hour, showing the exact time the observer is at his station, and the daily slips are to be forwarded, with the weekly report, to the State Fire Warden at the end of each week. The clock system affords a protection not only to the State, but to the man in charge of the observation station as well. Each observation man is directly under the supervision of the district forest warden, and shall forward him a copy of his weekly report. He must become thoroughly familiar with the territory under his supervision, studying the map and country carefully, becoming familiar with the names of the different mountains, hills, streams, ponds, roads, trails, railroads and trolley lines. He should know the local names which prevail in the region, the settlements where help may be collected quickly in case of fire, and the telephone connections in all directions from the station. All such information will assist in getting help to a fire as soon as smoke arises.

The weekly report has printed instructions on the back. This report is to be filled out each day, regardless of whether any fires are observed or not. If there are no fires, one line should be used each day, showing weather conditions, wind, etc. All fires observed must be reported. The observer must be very particular about the location of a fire, time observed, who notified, time of notification and time extinguished. He should keep his telephone in working order, calling up the central office each morning and after storms, to determine whether or not the line is in working order. If it fails to work he should go over the line and try to find breaks, and get it in working condition as promptly as possible. He should not open, disconnect or interfere with the telephone instrument in any way until he is absolutely satisfied that the line is not in perfect order. If it becomes necessary to examine the instrument, unless he is perfectly familiar with the construction and repair of the telephone he should not interfere with it in any way, but get a competent telephone man to make the necessary repairs. In case of inattention of any of the town forest wardens or their deputies he should notify the district forest warden and the State Forester's office.

(4) *Forestry Conventions.* — In order to enable the various officials to keep in close touch with the forest wardens throughout the State, and also to enable neighboring groups of wardens to discuss methods, equipment, etc., the State Forester is allowed to spend not exceeding \$2,000 for conventions during a year. While forest fires, their control and management form a very important part of the program, such subjects as reforestation, thinning and general forestry improvement practices are discussed.

(5) *State Aid for Forest-Fire Equipment.* — Massachusetts expects its towns with a valuation of over \$1,750,000 to be able to support its own forest-fire equipment, but all towns having a valuation below this amount

the State agrees to reimburse for 50 per cent. of an expenditure not to exceed \$500. This has encouraged our poorer towns to greater protection. The forest-fire lookout stations have been built usually on the co-operative plan, the towns covered paying one-half and the State the remainder.

(6) *Utilization.* — No more important part of forestry needs attention than does that of finding the best use for all products. Massachusetts was the first State to publish a bulletin on "Forest Utilization." This was done in co-operation with the United States Forest Service. We are at present continuing these studies, and have some very promising experiments being carried on.

(7) *Brush and Slash.* — One of the great causes for the larger forest fires, and hence those of greatest damage, has come from fire getting into old slashings or brush left from operating lots. A law was enacted last year, taking effect Jan. 1, 1915, making it compulsory for every one operating a tract of forest land to leave a 40-foot strip free of slash or brush, as a natural fire prevention line, along the highways, railroad locations and all abutters' lands where there is danger from fire.

(8) *Railroad Fires and Railroads.* — A State law compels all railroad engines to carry spark arresters, and by an order from the Public Service Commission all engines running in Massachusetts are subject to examination by agents deputized for this work. The commission has a special man in charge of this inspection, and the State Fire Warden also permanently assigns one of his deputies to overcoming railroad fires. They are experts on the inspection of spark arresters, ash pans, grates, etc.

The signal for all forest fires is a whistle of one long and three short blasts, and all engineers are required by law to comply with it.

By a Massachusetts law all expenses a town or city may have incurred in extinguishing railroad fires are reimbursed by the railroads responsible. This is in addition to the property damages themselves.

Since these enactments far better co-operation has resulted, and railroad fires are rapidly diminishing.

At our forest warden conventions the railroads are always represented.

(9) *Forest Taxation.* — Few subjects have received more agitation in Massachusetts than this one. An amendment of the State Constitution — a process of several years — was found necessary, followed by confirmation on the part of the people. Last year, however, the recommendations of a special forest taxation commission were adopted. At present, therefore, we have a modern system of taxing forest lands. Briefly, there is an annual tax upon the land at cut-over valuation, and then a so-called products tax is assessed when the products are harvested. This law safeguards any one who desires to invest in forestry from being imposed upon, and, as well, expects from the owner recognized methods of culture.

(10) *Reforestation Assistance to Owners.* — A Massachusetts law is in force whereby any one having a tract of forest land adapted to reforestation may, by turning the title over to the State Forester, temporarily have it reforested for him at cost. The tract is then supervised by the State Forester until the owner cares to redeem the same. The period for re-

demption is ten years, and thereafter it becomes the property of the State. This law has been very popular, and has enabled the State Forester to start forestry work in many sections where individuals would not have the time or feel experienced enough to undertake the work. As the law contemplated scattering the work over the State as demonstrations and object lessons, the tracts thus planted range from 10 to 80 acres. The State in some instances has bought tracts for such use, but in this case the law restricts the acreage in any one year to 80 acres. When land has been thus handled for the individual, and has been redeemed, the owner is required to thereafter handle the plantation according to modern forestry methods.

In doing this work the State Forester of course is anxious to demonstrate and satisfy the owner that the work is economically and properly done. This encourages others to do similar work who do not care to turn the title over to the State. Either method is getting results, and that is the goal in view.

(11) *Causes and Numbers of Forest Fires.* — Each season we have secured more definite data as to causes of fires, and through a better checking up system practically all fires are now reported to the State Fire Warden. Blank forms are filled out by the forest warden after each fire, and mailed to the State Forester's office. With the causes of forest fires well understood it is less difficult to study out ways and means of obviating them.

(12) *State Forests.* — Our recent Legislature enacted a law empowering the Governor to appoint two State Forest Commissioners who, with the State Forester, are to purchase lands for State forests. The sum of \$90,000 was appropriated for this purpose. The commission is restricted in the purchase price of the proposed forests. They are not allowed to pay over \$5 an acre on the average. The policy of the State is to establish these proposed forests on lands now unproductive and likely to remain so, did the State not step in and reclaim them for forestry. Already the commission has gone over the State quite thoroughly, and many prospective tracts are in view. These tracts will give the State Forester an opportunity to demonstrate forestry on a more pretentious scale.

(13) *State Forest Nurseries.* — The State of Massachusetts grows its own small trees. A nursery of 7 acres is established on the farm of the Massachusetts Agricultural College at Amherst, and another of 4 acres is located at Barnstable on the Cape. Last year our inventory showed 7,000,000 trees, and our seed beds are increased in numbers this season.

A nursery has been started at the Massachusetts State Farm at Bridgewater, and this will be enlarged upon for transplant stock next season. With the advent of State-owned forests we will need a large output of young stock.

(14) *Lectures and Exhibitions.* — The State Forester and his assistants are called upon for talks and lectures by many organizations, colleges, schools, boards of trade, etc., and it has been through this medium that many people have become interested in forestry. The State Forester alone gave fifty-four talks and lectures one season. This season the

department has a new feature in demonstrating its work by moving pictures. Numerous exhibits are made of the State work each year at various fairs, food shows, sportsmen's shows, etc. A State Forester's exhibit is being prepared at the present time for the Panama-Pacific Exposition at San Francisco next year.

(15) Other regulations worthy of mention are: —

(a) Power of the Governor to issue a proclamation closing the open season for hunting in dry times. This action was taken in the State this fall for the first time in many years.

(b) Boy scouts are voluntarily becoming our best forest-fire fighters. Co-operative encouragement here brings remarkable results.

(c) Fish and game deputies have the same authority in many respects as forest wardens. They are required to report all fires to the forest wardens.

(d) The rural mail carriers who penetrate practically every forest section of the State are required to report all forest fires to the forest wardens in their territory. Three hundred carriers throughout the State, traveling a total mileage of 6,000 miles each day, are of great assistance in getting help to extinguish fires in their incipency.

In conclusion, I trust I have at least given you a general idea of what the Massachusetts State forestry work is. Much more might be pointed out, as, for example, the great undertaking in the suppression of the gypsy and the brown-tail moths, which Massachusetts is doing at great expense, but which has already been discussed by the writer before this association.

The most important point I wish to make is that the forestry work in Massachusetts has progressed, and now that enough laws and general regulations are at hand for encouragement in forestry it is believed we shall from now on see more rapid development along modern forestry lines.

LECTURES AND ADDRESSES.

The unabated interest felt by the citizens generally throughout the State in forestry matters is evidenced by the continual demands made upon the department by public-spirited organizations for lectures on the subject. While it was impossible to accept all the invitations received, speakers were sent to the following meetings: —

Brockton and Abington Boards of Trade.	Farmers' Club of Leominster.
Massachusetts State Board of Agriculture.	Men's Club, Newton Highlands.
New England Forest Fire Conference.	Malden Natural History Club.
Young Men's Catholic Union, Brookline.	Oakham Farmers' Club.
Brotherhood of Hope Church, Springfield.	Berkshire Meeting, Forest Wardens, Pittsfield.
	Springfield Meeting, Forest Wardens.
	Rural Progress Meeting.



Dinner hour in the lumber camp, Stevens estate, North Andover.



Improvement thinning in a mixed stand of chestnut and pine, where the chestnut was affected with blight. The pine is left standing to reseed the land.

Worcester Meeting, Forest Wardens.
 Fitchburg Meeting, Forest Wardens.
 Greenfield Meeting, Forest Wardens.
 Farmers' Week, Massachusetts Agricultural College.
 South Bristol Farmers' Club.
 Short Courses, Massachusetts Agricultural College.
 Haverhill Meeting, Forest Wardens.
 Boston Meeting, Forest Wardens.
 Middleborough Meeting, Forest Wardens.
 Marlborough High School.
 Massachusetts State Firemen's Association.
 Cornell University — Forestry Dedication.
 Marshfield Farmers' Club.
 Old Colony Pomona, Bridgewater.
 Middleborough Farmers' Meeting.
 Quaboag Pomona Grange, West Brookfield.
 Cape Cod Cranberry Growers' Association.
 New Hampshire State Board of Trade.
 Oxford Pomona Grange.
 Harvard Single Tax Colony.

Wakefield Grange.
 Newton Forestry Meeting.
 West Roxbury Women's Club.
 Massachusetts State Grange.
 Worcester Board of Trade.
 Winchendon Public Forestry Meeting.
 Williams College Forestry Talks.
 The Cottages Association, Cotuit, Mass.
 Colony Club, Sagamore Beach.
 State Grange Meeting, Southwick.
 State Grange Meeting, East Longmeadow.
 State Grange Meeting, Greenwich.
 Winter Hill Improvement Association.
 West Medway Grange.
 Bridgewater Grange.
 New England Florists' Association, Horticultural Hall.
 Fitchburg Women's Club.
 Holden Improvement Society.
 The Princeton Grange.
 Franklin Farmers' Club.
 State Board of Trade.
 Old Colony Pomona Grange.
 Field Day at Lincoln.
 Westminster Grange.

FIELD MEETINGS OF THE STATE GRANGE.

It may be said without fear of exaggeration that the people of Massachusetts come nearer to applying the intensive method to their industrial and agricultural interests than any other section. This spirit in enterprise and progress is demonstrated in many ways, but in none with more marked effect than by the work of the Patrons of Husbandry. The organized efficiency of the grange is well known and is of a high order, and is made possible by the unselfish personal service given to its endeavors by both the officers and members. A fact which is more and more apparent as the years go by is that as an organization it has become a powerful factor in accomplishing those ends calculated to promote to the fullest extent the social and industrial life of the community.

It has been the custom of the State Grange during the past few years to hold summer field meetings in various sections of the State. These meetings have been very popular with the members of the order and have been largely attended. At each meeting speakers have been provided to discuss matters

relating to the welfare of the Commonwealth. The summer field meetings for 1914 were as follows:—

Middlesex Essex Pomona, Wilmington, Silver Lake.	Old Colony Pomona, Bridgewater.
Cape Cod Pomona, Cotuit.	Essex County Pomona, Canobie Lake.
Chebaeco Pomona, Gloucester, Riverdale Park.	Boro Pomona, Westborough.
Worcester Central Pomona, Worcester, Green Hill Park.	Worcester West Pomona, Winchendon, Lake Dennison.
Berkshire County, Pittsfield, with J. H. Noble.	Connecticut Valley Pomona, Greenfield, Shattuck Park.
Western Hampden Pomona, Southwick, with F. D. Lambson.	Mayflower Pomona, North Hanson.
Worcester East Pomona.	Middlesex Norfolk, Cochituate.
Middlesex Worcester Pomona, Ayer, Ayer Park.	Quaboag Pomona, West Brookfield.
Middlesex North Pomona, Tyngsborough.	Worcester Southwest, Sturbridge.
Worcester Norfolk Pomona, Mendon.	Norfolk Pomona, Norwood.
Hampshire Pomona, Amherst.	Deerfield Valley Pomona, Colrain.
Springfield Pomona, East Longmeadow.	Hillside Pomona, Cummington.
Swift River, Greenwich Plains.	Berkshire South, Lake Buell, Sumner's Landing.
	Worcester Franklin, Brookside Park (Athol and Orange).
	Middlesex Central Pomona.

The State Forestry Department was represented at many of these meetings by State Forester F. W. Rane, or the secretary, Mr. C. O. Bailey, at all of which meetings an enthusiastic interest was shown in the work of the department as described by the speakers.

WORK ON STATE HIGHWAYS.

The usual custom of this department having supervision of the insect work along the State highways throughout the moth-infested district, has been carried out again this year.

Work was done in the following cities and towns on the State highways, and paid for by the Highway Commission:—

LIST OF HIGHWAY WORK, 1914.

Abington,	\$20 34	Attleborough,	\$16 50
Acton,	156 63	Auburn,	27 58
Amesbury,	114 51	Ayer,	33 76
Amherst,	41 63	Barnstable,	358 00
Andover,	87 33	Barre,	58 00
Ashburnham,	73 75	Bedford,	89 45
Ashby,	53 50	Bellingham,	12 70
Ashland,	32 58	Beverly,	290 79
Athol,	34 40	Billerica,	69 25

LIST OF HIGHWAY WORK, 1914—*Continued.*

Bourne,	\$157 06	Marshfield,	\$42 86
Boxborough,	128 65	Mashpee,	5 50
Braintree,	22 38	Melrose,	33 00
Brewster,	36 00	Merrimac,	41 97
Bridgewater,	26 57	Methuen,	85 35
Brookfield,	76 95	Middleborough,	13 44
Burlington,	99 75	Middleton,	14 75
Canton,	11 70	Montague,	20 05
Chatham,	18 25	Natick,	59 41
Chelmsford,	105 10	Needham,	38 36
Chester,	112 88	Newbury,	88 53
Cohasset,	40 41	Newburyport,	38 00
Concord,	231 04	North Andover,	177 45
Deerfield,	12 25	North Attleborough,	58 05
Dennis,	18 00	North Reading,	54 50
Dover,	40 65	Northborough,	105 00
Dracut,	68 40	Northbridge,	19 83
Duxbury,	30 94	Northfield,	72 50
Essex,	27 51	Norton,	40 67
Falmouth,	121 80	Orleans,	35 60
Fitchburg,	65 76	Palmer,	44 19
Foxborough,	94 93	Pembroke,	5 11
Framingham,	104 40	Pepperell,	68 47
Franklin,	37 50	Pittsfield,	64 00
Gardner,	13 20	Plainville,	25 15
Gloucester,	21 00	Princeton,	14 00
Grafton,	83 75	Quincy,	29 97
Greenfield,	27 00	Reading,	120 25
Groton,	37 29	Rehoboth,	47 20
Groveland,	59 26	Rockland,	29 69
Hadley,	71 38	Rockport,	13 00
Hamilton,	106 33	Rowley,	101 17
Hardwick,	28 84	Russell,	61 45
Harvard,	46 81	Salisbury,	95 88
Harwich,	4 50	Sandwich,	38 00
Haverhill,	132 45	Scituate,	150 20
Hingham,	27 63	Seekonk,	50 00
Holbrook,	14 00	Shrewsbury,	117 80
Holliston,	63 02	Somerset,	150 00
Hudson,	44 46	South Hadley,	77 00
Huntington,	104 56	Southborough,	60 96
Ipswich,	44 50	Spencer,	21 05
Lakeville,	9 75	Sterling,	100 50
Lancaster,	55 10	Stoneham,	88 30
Leicester,	29 00	Stoughton,	21 25
Leominster,	64 00	Sudbury,	219 30
Lexington,	94 45	Sutton,	12 31
Lincoln,	65 35	Swampscott,	4 00
Littleton,	72 80	Swansea,	126 25
Lowell,	42 68	Taunton,	23 75
Lunenburg,	71 40	Templeton,	73 30
Marion,	18 00	Tewksbury,	78 39
Marlborough,	228 65	Townsend,	125 00

LIST OF HIGHWAY WORK, 1914—*Concluded.*

Truro,	\$10 50	Westford,	\$184 00
Tyngsborough,	169 08	Westminster,	19 35
Ware,	53 50	Weston,	96 00
Warren,	44 54	Westwood,	12 25
Wayland,	102 83	Weymouth,	130 50
Wellfleet,	44 50	Whitman,	19 95
Wenham,	94 25	Wilmington,	66 74
West Boylston,	51 11	Winchester,	67 25
West Bridgewater,	28 11	Woburn,	206 19
West Brookfield,	44 54	Worcester,	29 54
West Newbury,	115 62	Yarmouth,	47 20
Westborough,	39 27		
Westfield,	118 85		\$10,038 12

PARASITE WORK.

REPORT OF MR. A. F. BURGESS, IN CHARGE OF MOTH WORK, PARASITE
LABORATORY, MELROSE HIGHLANDS, MASS.

JAN. 12, 1915.

DEAR PROFESSOR RANE: — Dr. L. O. Howard, chief of the Bureau of Entomology, has requested me to prepare a brief report on the parasite work for the year 1914. The information enclosed relates particularly to conditions in Massachusetts, and is of especial interest to the citizens of this State.

Very truly yours,

A. F. BURGESS,
In Charge of Moth Work.

The plan for conducting the parasite work of the gypsy and brown-tail moth has been to collect and rear the most important natural enemies of these insects, and colonize them in territory remote from where the parasites had already spread. This was done in order to enable the beneficial species to become established over the entire infested territory as rapidly as possible. In order to secure further information in regard to the work of the parasites of the gypsy moth in Europe, Dr. John N. Summers, one of the assistants in the Bureau at the Gypsy Moth Laboratory, visited Germany during the spring and summer of 1914.

Unfortunately, severe gypsy-moth outbreaks did not exist in Germany this year, so that he was not able to obtain as much information as was anticipated. He visited, however, a number of large forests in Hungary where the gypsy moth was present in large numbers, and secured some data concerning the habits of this insect in its native home. Owing to the fact that he did not receive information in regard to the presence of this gypsy-moth outbreak until late in the season, it was impossible to secure parasites for shipment to this country. No parasites have been imported during the present year.

During the spring of 1914, 1,500,000 specimens of *Anastatus bifasciatus* were colonized. Most of these were liberated in towns in northern Massachusetts, but a few towns in New Hampshire were also supplied. An examination of egg clusters from some of the colonies of this species which were liberated several years ago showed that the parasitism is sometimes as high as 43 per cent., and very commonly 25 per cent. of the eggs in a cluster are destroyed by this insect.

In the fall of 1914 collections in the field enabled us to rear at the laboratory large numbers of *Schedius kuvanae*, and over 2,000,000 specimens of this species have been colonized in 111 towns, 60 of which are located in Massachusetts. The colonization work in Massachusetts was begun in the Cape district, and extended in a crescent form to the New Hampshire line, plantings having been made in practically all the known woodland colonies of the gypsy moth in southern Massachusetts.

During the summer *Compsilura concinnata*, one of the species of *Tachinid* flies which has become most firmly established in this country, was found in many localities throughout the area infested by the gypsy moth. This species seems to occur locally, and it is sometimes present in large numbers in small and scattered moth infestations. One generation of this parasite usually develops on the caterpillars of the brown-tail moth in the early spring, and as the latter species was locally rather than generally common throughout the infested area last spring, this may, in part, account for the local rather than general distribution of *Compsilura*.

Apanteles lacteicolor, a parasite of both the small gypsy and brown-tail moth caterpillars, was not as abundant as usual this season. The larvæ of this species hibernate within the small brown-tail caterpillars in the webs during the winter, and as there was a heavy mortality of the brown-tail caterpillars during the winter of 1913-14, the number of *Apanteles* was seriously reduced.

Several other introduced parasitic species have been found in small numbers, but not common enough to cause any appreciable benefit. Another species of *Apanteles*, *Apanteles melanoscelus*, was found in satisfactory numbers in Melrose and vicinity. Only one colony has been liberated in this country, and this was the last species which was imported. It has survived two New England winters and gives promise of being a very satisfactory enemy of the gypsy moth. Several years, however, will be required for the insect to become abundant enough to spread over the infested area.

The *Calosoma* beetle, *Calosoma sycophanta*, was more abundant and was found over a larger area than in any previous year. A number of colonies were liberated in remote parts of the infested area. The work of this insect is very striking, and enormous numbers of the gypsy and brown-tail moth are destroyed by this species.

The summer of 1914 was unusually mild, particularly during June and early July. During this period the gypsy-moth caterpillars flourished and their numbers were not reduced to any great extent by the "wilt" disease until the caterpillars were nearly full grown. During the past two years

the parasites and the "wilt" disease have made enormous inroads on the gypsy-moth larvæ during June and early July, but less reduction of the caterpillars took place this year over the entire infested area as a whole.

In many localities the gypsy-moth infestation has decreased materially, as a result of the work of natural enemies, but in some of the older infested territory, particularly south of Boston and on Cape Cod, a marked increase in infestation has been observed.

It is believed that a reduction will be made by natural enemies during the coming year, but the problem is very complex, and with our present knowledge it is impossible to state definitely what will happen next summer. Doubtless there will be seasons when an unexpected increase of the moth will take place, but the general trend for the past few years has indicated that the natural enemies are bringing about greatly improved conditions.

NEW LEGISLATION.

The Legislature of 1914 is fairly entitled to the credit of having enacted more important legislation calculated to advance the forestry interests of the Commonwealth than has been done in any previous year.

Forest Taxation.

Much has been said during the past few years with regard to the importance and desirability of a law which would change the unsatisfactory method of taxing wild and forest lands which has been in vogue in this State from time immemorial. The insistent demand of those interested in the subject culminated in the passage by the last Legislature of an act entitled, "An Act to provide for the classification and taxation of wild or forest lands." This bill was prepared by a commission appointed by the Governor for that special purpose. While the act is too long to be published in this report, the State Forester has recently issued a booklet containing a full text of the law with explanatory notes, which will be mailed to any one on request.

Slash Law.

Another law, which if properly enforced cannot fail to be of great benefit in reducing the forest fire evil, is the so-called slash law, which is printed under the head of the State Fire Warden's report.

Injurious Insects.

The State Forester desires also to call attention to an act passed enabling cities and towns to suppress the tent caterpillar, leopard moth and elm beetle. This act was passed upon the petition of prominent town and city officials of the metropolitan district, and reads as follows: —

ACTS OF 1914, CHAPTER 404.

AN ACT TO AUTHORIZE CITIES AND TOWNS TO SUPPRESS THE TENT CATERPILLAR, LEOPARD MOTH AND ELM BEETLE.

Be it enacted, etc., as follows:

SECTION 1. The city forester, superintendent or other persons having charge of the suppression of gypsy and brown tail moths in each city and town in the commonwealth, or, where there is no such person, the tree warden, may destroy within the limits of his city or town the tent caterpillar, leopard moth and elm beetle, if authorized so to do by the mayor and city council or commission in cities, or by the selectmen in towns.

SECTION 2. For the purposes of this act the city forester or other officer designated in section one of this act may enter upon private land, and the owners of private land may be taxed for work done under the provisions of section one of this act in the manner provided by sections six and seven of chapter three hundred and eighty-one of the acts of the year nineteen hundred and five and acts in amendment thereof and in addition thereto: *provided, however*, that nothing contained in this act shall require the commonwealth to pay any part of any such expense, other than for the suppression of the gypsy and brown tail moths, that no land shall be assessed under the provisions of this act which has been assessed the maximum amount provided by said sections six and seven and amendments thereof for the suppression of the gypsy and brown tail moths, and that the aggregate assessment on any parcel of private land for the suppression of the tent caterpillar, leopard moth, elm beetle and gypsy and brown tail moths shall not exceed the maximum provided by said sections six and seven and the amendments thereof.

SECTION 3. This act shall take effect upon its passage. [*Approved April 23, 1914.*]

State Forest Commission.

Chapter 131, Acts of 1913, creating a Forest Tax Commission, authorized said commission, in addition to a study of the tax problem, to "investigate the present policy of the commonwealth with regard to the acquisition and management of wild or forest lands and report what further legislation, if any, is necessary." In its report to the Legislature of 1914, the

commission recommended the creation of a commission to acquire suitable lands for State forests. In accordance with the commission's recommendation, the following bill was enacted:—

ACTS OF 1914, CHAPTER 720.

AN ACT TO ESTABLISH A STATE FOREST COMMISSION AND TO PROVIDE FOR THE PURCHASE OF LANDS FOR STATE FORESTS.

Be it enacted, etc., as follows:

SECTION 1. There is hereby established a state forest commission, to be composed of three persons, one of whom shall be the state forester and two other members who shall be appointed by the governor, with the advice and consent of the council, and who shall serve without compensation. The term of office of the appointive members of the commission shall be six years, except that when first appointed one of the members shall be appointed for six years and one for three years. Thereafter one member shall be appointed every third year.

SECTION 2. The commission shall have power to acquire for the commonwealth by purchase or otherwise, and to hold, woodland or land suitable for timber cultivation within the commonwealth. The commission may, after a public hearing, sell or exchange any land thus acquired which in the judgment of the commission can no longer be used advantageously for the purposes of this act. The average cost of land purchased by the Commission shall not exceed five dollars an acre.

SECTION 3. Lands acquired under the provisions of this act shall be known as state forests and shall be under the control and management of the state forester. He shall proceed to re-forest and develop such lands and shall have power to make all reasonable regulations which in his opinion will tend to increase the public enjoyment and benefit therefrom and to protect and conserve the water supplies of the commonwealth. The state forester shall keep and shall publish in his annual report an account of all money invested in each state forest and of the annual income and expense thereof.

SECTION 4. In the reforestation, maintenance, and development of lands purchased under this act, the state forester, so far as it is practicable, shall obtain the labor necessary therefor under the provisions of chapter six hundred and thirty-three of the acts of the year nineteen hundred and thirteen, and acts in amendment thereof and in addition thereto.

SECTION 5. Land acquired under the provisions of this act shall be exempt from taxation; but the commonwealth shall reimburse cities and towns in which such lands are situated for taxes lost by reason of their acquisition, in the same manner and to the same extent as in the case of lands acquired for public institutions under the provisions of chapter six hundred and seven of the acts of the year nineteen hundred and ten.

SECTION 6. The sum of ten thousand dollars may be expended during the present year and the sum of twenty thousand dollars may be expended annually for the four succeeding years by the state forest commission in the

acquisition of lands under the provisions of this act: *provided*, that the said commission may, at its discretion, authorize the state forester to expend a part of said sum in the maintenance of said lands. If any part of said twenty thousand dollars remains unexpended at the close of any year, the balance may be expended in the following year. The said commission may also expend not more than five hundred dollars annually for its necessary expenses incurred in carrying out the provisions of this act.

SECTION 7. This act shall take effect upon its passage. [Approved June 29, 1914.]

FINANCIAL STATEMENTS.

General Forestry.

In accordance with section 6, chapter 409 of the Acts of 1904, as amended by section 1, chapter 473 of the Acts of 1907, the following statement is given of the forestry expenditure for the year ending Nov. 30, 1914:—

State Forester's Expenses.

Appropriation for 1914,	\$20,000 00
Expenditures:—	
Salaries of assistants,	\$6,188 82
Traveling expenses,	3,030 69
Stationery and postage, etc.,	327 87
Printing,	31 98
Maps, photographs, material, etc.,	297 80
Equipment, tools, etc.,	223 66
Sundries, including teaming,	133 13
Nursery account:—	
Pay roll,	6,541 50
Travel,	23 13
Equipment,	1,836 99
Seeds and seedlings,	711 41
Express and freight,	583 78
Sundries,	69 13
	<hr/>
	19,999 89
	<hr/>
Balance returned to treasury,	\$0 11

Purchase and Planting of Forest Lands.

Appropriation for 1914,	\$10,000 00
Receipts:—	
Wm. D. Sohier,	120 00
Davis Hardware Company—rebate,	28 42
	<hr/>
	\$10,148 42
	<hr/>
Amount carried forward,	\$10,148 42

Amount brought forward, \$10,148 42

Expenditures:—

Pay roll,	\$9,186 44	
Travel,	99 60	
Tools and equipment,	272 69	
Express, freight and teaming,	247 47	
Telephone,	3 95	
Land,	330 00	
Sundries,	8 07	
	<hr/>	10,148 22

Balance returned to treasury, \$0 20

Prevention of Forest Fires.

Appropriation for 1914, \$23,000 00

Receipts:—

New England Telephone and Telegraph Com- pany—rebate,	58	
Various towns for cans, brooms, etc.,	643 64	
Town of Falmouth,	350 00	
Town of Dartmouth,	150 00	
Town of Yarmouth,	100 00	
Town of Barnstable,	350 00	
City of Fall River,	225 00	
	<hr/>	\$24,819 22

Expenditures:—

Salaries,	\$13,972 94	
Travel,	3,920 39	
Printing,	991 44	
Stationery and postage,	300 39	
Equipment,	1,390 21	
Construction,	3,203 52	
Telephone,	898 82	
Express, freight and teaming,	80 89	
Sundries,	59 60	
	<hr/>	24,818 20

Balance returned to treasury, \$1 02

Reimbursement for fire-fighting apparatus to towns, . . . \$2,127 05

Suppression of Gypsy and Brown-tail Moths.

The balance shown on the general appropriation for the suppression of the gypsy and brown-tail moths, as carried at the end of the fiscal year, will be practically expended in reimbursements to towns and cities for the work of the year ending Nov. 30, 1914.

General Appropriation.

Balance on hand, Nov. 30, 1913,	. . .	\$121,558 10
Less reimbursement paid for 1913,	. . .	48,310 36
		<hr/>
Balance for 1914 work,	. . .	\$73,247 74

Receipts: —

Town of Braintree,	. . . . .	220 00
Town of Weymouth,	. . . . .	585 90
City of Lynn,	. . . . .	1,361 72
City of Quincy,	. . . . .	241 87
Town of Westborough,	. . . . .	404 43
Town of Natick,	. . . . .	87 80
Town of Southborough,	. . . . .	39 96
Town of Boylston,	. . . . .	518 07
Town of Dedham,	. . . . .	1,159 98
Town of Lincoln,	. . . . .	79 20
Town of Wellesley,	. . . . .	3 50
Town of Raynham,	. . . . .	37 42
Town of Maynard,	. . . . .	79 29
Town of Ayer,	. . . . .	110 36
Town of Andover,	. . . . .	204 68
Town of Ashland,	. . . . .	613 80
Town of Rochester,	. . . . .	29 35
Town of Easton,	. . . . .	12 50
Town of Topsfield,	. . . . .	1,974 51
Town of Royalston,	. . . . .	3 90
City of Medford,	. . . . .	1,040 94
Town of Milton,	. . . . .	2,391 15
Town of Hingham,	. . . . .	393 68
Appropriation for 1914,	. . . . .	125,000 00
Town of Arlington,	. . . . .	1,172 67
Town of Wakefield,	. . . . .	829 68
Dow Chemical Company,	. . . . .	15 26
Town of Braintree,	. . . . .	7 99
		<hr/>

Amount carried forward, \$211,867 35

<i>Amount brought forward,</i>		\$211,867 35	
Town of Stoneham,	47	12	
Salem Cadet Association,	113	95	
Town of Natick,	44	53	
Town of Milton,	18	50	
Harbor and Land Commission,	82	01	
Prevention of forest fires,	295	80	
Fall River Water Works,	47	80	
Dover gypsy moth fund,	2,236	10	
State Forester's expenses,	40	84	
Special North Shore fund,	5,655	77	
Appropriation for 1915,	75,000	00	
City of Quincy,	1,127	34	
Checks returned on Lexington and Princeton pay rolls,	7	00	
New York, New Haven & Hartford Railroad Company (for lost magneto),	57	75	
Balance on appropriation for exhibit at Food Fair,	16	01	
Town of Hopkinton,	1,142	60	
Use of outfit in thinning work,	101	50	
			\$297,901 97
Office expenses: —			
Salaries of clerks,	\$3,061	96	
Rent of offices,	2,409	96	
Stationery and postage,	1,661	53	
Printing,	1,387	94	
Office supplies,	281	25	
Sundries, including telephone, lights, express, etc.,	1,318	48	
Field expenses: —			
Pay roll,	44,493	86	
Travel,	9,228	01	
Supplies,	102,513	92	
Rent of supply store,	750	00	
Store equipment,	207	90	
Special work,	8,200	00	
Reimbursement to towns and cities,	31,104	25	
Sundries, including freight, express, teaming, etc.,	2,408	28	
			209,027 34
Balance on hand Nov. 30, 1914,			\$88,874 63
Reimbursement paid December, 1914, and January, Feb- ruary and March, 1915, for the year 1914,			\$39,670 10

Special North Shore Fund.

Balance from 1913,	\$9,999 76	
Receipts: —		
City of Beverly,	3,500 00	
Town of Manchester,	3,500 00	
W. D. Sohier, agent,	7,000 00	
South End Improvement Association of Rock-		
port,	190 00	
Town of Rockport,	200 00	
F. W. Rane, State Forester,	7,000 00	
Appropriation for suppression of gypsy and		
brown-tail moths,	3,448 83	
Town of Swampscott,	19 50	
F. W. Rane, State Forester (for Rockport		
work),	200 00	
Dover gypsy moth fund (for use of truck), .	108 75	
	<hr/>	\$35,166 84
Expenditures: —		
Pay roll,	\$14,053 33	
Travel,	458 23	
Supplies,	10,443 72	
Rent,	296 20	
Stationery and postage,	3 53	
Store equipment,	8 60	
Sundries, including teaming and express, .	1,572 53	
	<hr/>	26,836 14
Balance on hand Nov. 30, 1914,		\$8,330 70

Dover Gypsy Moth Fund.

A special fund was created in August, 1913, for woodland work in the town of Dover, the work to be done in a co-operative manner, similarly to that done on the North Shore. A statement of the income of the fund and expenditures under it is given here, from the beginning of the work to the end of the present fiscal year.

Receipts: —	
Town of Dover,	\$1,000 00
F. W. Rane, State Forester,	1,000 00
Town of Dover,	1,220 40
	<hr/>
Amount carried forward,	\$3,220 40

<i>Amount brought forward,</i>	\$3,220 40	
F. W. Rane, State Forester,	2,000 00	
Union Lumber Company,	7 00	
Winthrop Harvey,	197 38	
R. E. Sherman,	93 80	
F. H. Diehl & Son,	1,133 96	
Richard Bragey,	2 40	
Appropriation for suppression of gypsy and brown-tail moths,	4 84	
J. E. Lonergan & Co.,	3 00	
Town of Dover,	1,000 00	
F. W. Rane, State Forester,	1,000 00	
Poore & Chadwick,	7 92	
Simpson Bros. Corporation,	65 25	
Geo. M. Cushing,	29 00	
Winthrop A. Harvey,	97 76	
W. Rodman Fay,	149 24	
Robert K. Rogers,	8 80	
Tools lost,	2 00	
Norfolk Hunt Club,	125 00	
Richard Smalley,	13 50	
Robert Baker,	3 50	
Turner Bailey,	4 00	
C. F. Eddy & Co.,	66 00	
Geo. D. Hall,	57 67	
Town of Dover,	1,000 00	
	<hr/>	\$10,292 42
Expenditures:—		
Pay roll,	\$6,788 54	
Travel,	52 09	
Supplies,	2,358 84	
Sundries,	31 13	
	<hr/>	9,230 60
		<hr/>
Balance on hand Nov. 30, 1914,		\$1,061 82

The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1914. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts, according to the amount of their net expenditures or their



Logs in the boom at Connecticut River Lumber Company, Mount Tom Junction, Mass. These logs have come down the river from the mountains of Vermont and New Hampshire.



Connecticut River Lumber Company, Mount Tom Junction, Mass. The largest sawmill in the State.

class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 97.

Third-class Towns.

Acton,	\$695 97	Middleborough,	\$836 47
Ashburnham,	114 38	Middleton,	226 83
Ashby,	46 05	Nantucket,	40
Ashland,	100 55	Newbury,	531 58
Auburn,	131 02	Norfolk,	111 96
Avon,	90 67	North Andover,	775 57
Ayer,	292 55	North Reading,	1,017 92
Bedford,	1,551 20	Northborough,	448 73
Berkley,	21 30	Norwell,	1,231 53
Berlin, ¹	1,720 60	Pembroke, ¹	1,920 17
Billerica,	814 96	Pepperell,	571 79
Bolton, ¹	2,060 31	Plainville,	150 97
Boxborough,	652 18	Plympton,	284 34
Boxford,	490 58	Princeton,	682 96
Boylston,	62 31	Raynham,	47 45
Bridgewater,	480 53	Rowley,	608 57
Burlington,	503 01	Salisbury, ¹	1,874 54
Carlisle,	625 50	Sandwich,	156 93
Carver,	667 93	Scituate,	1,063 61
Chelmsford,	1,185 21	Sherborn,	326 74
Deerfield,	3 76	Shirley,	405 15
Dracut,	849 75	Shrewsbury,	38 61
Dunstable, ¹	1,188 65	Southborough,	238 46
Duxbury,	202 35	Sterling,	426 59
East Bridgewater, ¹	1,930 39	Stoneham,	675 69
Essex,	141 22	Stoughton,	866 06
Georgetown, ¹	1,909 44	Stow, ¹	2,248 60
Groton,	754 94	Sudbury,	746 22
Groveland,	163 23	Templeton,	243 73
Halifax,	22 76	Tewksbury,	1,018 45
Hamilton,	774 01	Topsfield,	294 91
Hanover,	1,176 11	Townsend,	552 84
Hanson,	276 76	Tyngsborough,	1,021 85
Harvard, ¹	2,405 56	Wayland,	922 70
Holden,	299 57	Wenham,	571 71
Holliston,	58	West Boylston,	77
Hopkinton,	60 89	West Bridgewater,	366 55
Hudson, ¹	1,976 21	West Newbury,	215 42
Ipswich,	957 38	Westborough,	138 61
Kingston,	294 73	Westford,	912 82
Lincoln,	1,700 38	Westminster,	130 62
Littleton,	697 82	Whately,	5 26
Lunenburg,	676 75	Wilmington,	812 67
Lynnfield,	567 44	Winchendon,	325 73
Marshfield,	871 93		
Mashpee,	253 03		\$58,728 12
Merrimac,	216 59		

¹ Received sprayer from State, town or city paying one-half the cost.

First and Second Class Towns and Cities.

Andover,	\$864 17	Milton,	\$18 50
Barnstable,	456 98	Natick,	92 15
Braintree,	7 99	Newton,	4,789 55
Canton, ¹	2,997 60	Quincy,	1,133 92
Cohasset,	1,990 67	Reading,	1,850 11
Concord,	785 41	Saugus,	1,027 34
Danvers, ¹	1,967 97	Wakefield,	827 18
Gloucester,	526 18	Waltham,	1,454 30
Hingham,	1,258 18	Weston,	1,539 63
Lexington,	931 09	Weymouth,	1,873 06
Lowell,	386 58	Woburn,	867 21
Marlborough, ¹	2,486 28	Worcester, ¹	3,024 06
Medford,	640 40		
Methuen,	1,135 05		\$93,659 68

¹ Received sprayer from State, town or city paying one-half the cost.

Dover gypsy moth fund,	\$2,103 63
Fall River Water Works,	47 80
Forest fire prevention,	585 09
Forestry,	141 72
Pine Banks Park,	95 60
Forest thinnings,	286 16
Special North Shore fund,	5,647 41
Moth superintendents, etc.,	197 62
Office,	3 19
Automobiles,	33 43
Supply store,	4 10
Traveling sprayers,	886 86
Total amount disbursed through supply store,	\$103,692 29

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

The following table shows the reimbursement, amount of supplies furnished and net amount received from this office by cities and towns for 1913, the required expenditure before receiving reimbursement from the State, the total net expenditure, the amount received for work on private property returned to this office, the amount paid in reimbursement, gross amount of supplies, and total net amount received from this office by cities and towns for 1914, and also the required expenditure for 1915. In the last two columns is shown the number of spraying outfits, both large and small, owned by each town or city.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.		Large.	Small.
Abington, . . .	3	-	-	-	\$1,403 51	-	-	-	-	-	\$1,459 85	1	1	-
Acton, . . .	3	\$550 00	1 \$2,148 73	\$2,098 73	975 90	\$1,779 79	\$275 00	\$803 89	\$695 97	\$1,499 86	970 01	1	1	-
Acushnet, . . .	3	-	-	-	439 31	-	-	-	-	-	461 61	-	-	-
Anesbury, . . .	2	-	-	-	2,626 67	-	-	-	-	-	2,681 87	1	1	1
Andover, . . .	2	-	2 911 31	706 03	3,234 59	3,194 35	1,921 54	-	2 804 17	659 14	3,437 11	3	2	2
Arlington, . . .	1	-	2 1,172 67	1,158 32	5,000 00	5,456 02	-	-	-	-	5,000 00	2	3	3
Ashburnham, . . .	3	431 03	209 75	640 78	500 72	976 88	411 96	476 16	114 38	590 54	510 84	-	1	1
Ashby, . . .	3	271 97	174 17	446 14	248 18	731 28	38 19	483 10	46 05	529 15	257 75	-	1	1
Ashland, . . .	3	-	1,564 72	950 9	600 12	546 03	269 40	-	2 100 55	47 36	583 64	1	-	-
Athol, . . .	3	-	-	-	2,342 62	-	-	-	-	-	2,603 15	-	-	-
Attleboro, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-	-	-
Auburn, . . .	3	-	-	-	634 80	635 58	325 81	78	131 02	131 80	692 00	-	-	-
Avon, . . .	3	175 20	47 80	223 00	431 88	692 94	88 90	261 06	90 67	351 73	446 40	-	-	1
Ayer, . . .	3	-	1 1,804 80	1,204 80	927 85	1,017 57	340 05	116 68	292 55	409 23	928 05	1	-	-
Barnstable, . . .	2	-	-	-	3,370 26	3 418 25	-	-	4 481 14	-	3,503 85	2	-	-
Barre, . . .	3	-	-	-	1,053 58	-	-	-	-	-	1,089 64	-	-	-

¹ Received sprayer from State, town paying one-half the cost, \$600.² Town paid part of the amount for supplies.³ Work financed by State.⁴ Town paid full cost of supplies.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.*		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.	
Bedford, . . .	3	\$1,303 63	1 \$3,057 36	\$3,850 99	\$716 31	\$2,158 11	\$1,122 01	\$1,441 80	\$1,551 20	\$2,993 00	\$743 59	2	1	
Bellingham, . . .	3	-	-	-	382 26	-	-	-	-	-	401 72	-	-	
Belmont, . . .	2	-	-	-	3,297 49	-	-	-	-	-	3,530 53	1	2	
Berkley, . . .	3	68 28	43 80	112 08	208 21	263 46	65 68	55 25	21 30	76 55	225 43	-	1	
Berlin, . . .	3	775 79	237 52	1,013 31	249 31	1,269 00	368 81	419 69	1,720 60	1,540 29	259 20	1	-	
Beverly, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	-	
Billerica, . . .	3	75 41	603 61	679 02	1,385 80	1,723 64	630 38	337 84	814 96	1,152 80	2,211 97	1	2	
Blackstone, . . .	3	-	-	-	968 97	-	-	-	-	-	981 31	-	-	
Bolton, . . .	3	774 95	337 96	1,112 91	271 59	1,106 78	428 31	235 19	1,206 31	1,695 50	303 76	1	-	
Boston, . . .	1	9,849 89	-	9,849 89	5,000 00	30,167 55	14,272 57	11,752 43	-	11,752 43	5,000 00	-	-	
Bourne, . . .	2	-	-	-	3,057 72	-	-	-	-	-	3,132 73	1	-	
Boxborough, . . .	3	1,348 50	584 29	1,932 79	117 39	1,241 02	221 30	1,123 63	652 18	1,775 81	115 27	-	-	
Boxford, . . .	3	1,405 33	429 81	1,835 14	614 49	1,816 05	507 13	1,201 56	490 58	1,692 14	643 07	-	2	
Boylston, . . .	3	527 13	118 28	645 31	212 02	2 669 04	460 11	457 02	62 31	519 33	217 96	-	1	
Braintree, . . .	2	-	1,2 3,355 76	1,535 76	3,495 80	-	-	-	4 7 99	-	3,568 30	1	-	
Brewster, . . .	3	-	-	-	325 23	-	-	-	-	-	345 66	-	-	
Bridgewater, . . .	3	92 30	1 1,684 75	1,177 05	1,543 15	1,520 40	477 95	-	3 480 53	457 78	1,844 84	1	-	
Brockton, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-	-	

Brookfield,	3	-	-	545 63	-	-	-	-	-	562 80	-
Brookline, .	1	-	-	5,000 00	-	-	-	-	-	5,000 00	-
Burlington,	3	1,037 80	2,020 54	316 41	1,812 46	242 75	1,496 05	503 01	1,999 06	399 05	1
Cambridge,	1	-	-	5,000 00	-	-	-	-	-	5,000 00	2
Canton, .	2	800 00	772 83	2,543 23	4,293 07	1,434 11	440 34	12,907 60	2,478 42	2,715 96	2
Carlisle, .	3	2,549 92	460 29	199 17	2,589 09	414 23	2,389 92	625 50	3,015 42	196 06	1
Carver, .	3	623 71	246 92	790 28	1,800 46	775 30	1,010 18	667 93	1,678 11	838 47	1
Charlton, .	3	-	-	518 93	-	-	-	-	-	576 27	-
Chelmsford,	3	74 55	638 82	1,785 87	2,093 47	746 65	307 60	1,185 21	1,492 81	1,788 36	1
Chelsea, .	1	-	-	5,000 00	-	-	-	-	-	5,000 00	2
Clinton, .	2	-	-	3,661 51	-	-	-	-	-	3,705 84	1
Cohasset, .	2	131 85	2,447 58	4,417 09	4,423 23	2,421 23	-	3,190 67	1,597 45	4,078 02	2
Concord, .	2	366 87	672 17	3,520 46	4,190 26	831 60	378 76	785 41	1,007 09	3,684 74	4
Dana, .	3	-	-	-	-	-	-	-	-	180 76	-
Danvers, .	2	805 10	614 28	3,016 55	3,313 44	1,410 23	-	1,196 97	1,214 38	3,099 00	2
Dartmouth,	3	-	-	2,007 73	-	-	-	-	-	2,119 47	1
Dedham, .	1	-	3,410 81	5,000 00	-	-	-	-	-	5,000 00	2
Deerfield, .	3	-	-	989 03	-	-	-	3 76	3 76	1,039 83	-
Dennis, .	3	-	-	545 11	-	-	-	-	-	548 99	-
Dighton, .	3	-	-	548 88	-	-	-	-	-	598 63	-
Douglas, .	3	-	-	526 50	-	-	-	-	-	523 43	-

¹ Received sprayer from State, town paying one-half the cost, \$600.² Work financed by State.³ Town paid part of the amount for supplies.⁴ Town paid full cost of supplies.

CITIES AND TOWNS.	Class.	1913.			1914.					1915.		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Dover,	2	\$97 40	\$3 20	\$99 96	\$3,079 54	\$2,978 20	\$807 48	-	-	-	\$3,354 20	1	-
Draut,	3	576 66	320 54	897 20	1,008 01	1,405 23	1,253 52	\$487 22	\$849 75	\$1,336 97	1,012 66	1	1
Dudley,	3	-	-	-	825 65	-	-	-	-	-	848 20	-	-
Dunstable,	3	733 78	140 24	874 02	171 65	1,407 07	274 81	910 42	1,188 65	1,774 07	163 98	1	-
Duxbury,	3	309 72	269 04	578 80	1,764 16	2,169 09	1,060 25	199 04	202 35	401 39	1,456 14	1	-
East Bridgewater,	3	-	-	-	945 66	1,701 54	466 25	-	1,930 39	1,330 39	1,062 14	1	-
Easton,	2	-	212 50	-	2,792 83	-	-	-	-	-	2,847 19	1	-
Essex,	3	598 78	85 56	684 34	501 86	773 26	458 60	271 40	141 22	412 62	507 19	-	1
Everett,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-	2
Fairhaven,	3	-	-	-	1,631 10	-	-	-	-	-	1,400 44	-	-
Fall River,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	-
Falmouth,	2-1	-	-	-	4,341 80	-	-	-	-	-	5,000 00	1	-
Fitchburg,	1	-	1 87	1 87	5,000 00	-	-	-	-	-	5,000 00	1	-
Foxborough,	3	-	-	-	1,059 05	-	-	-	-	-	1,093 67	-	1
Framingham,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	-
Franklin,	3	-	-	-	1,880 97	-	-	-	-	-	1,918 97	-	-
Freetown,	3	-	-	-	407 73	-	-	-	-	-	353 78	-	-
Gardner,	2	-	-	-	4,195 02	-	-	-	-	-	4,538 55	-	1

Georgetown, . . .	3	1,097 63	454 95	1,552 58	509 37	1,515 86	812 90	406 49	11,909 44	1,715 93	528 67	1	2
Gloucester, . . .	1	829 48	213 83	936 40	5,000 00	5,471 58	1,513 26	-	3 526 18	263 09	5,000 00	1	1
Grafton, . . .	3	-	-	-	1,219 66	803 84	150 00	-	-	-	1,297 49	-	1
Great Barrington, .	2	-	-	-	2,749 12	-	-	-	-	-	2,770 19	-	-
Greenfield, . . .	2-1	-	2 01	2 01	4,597 02	-	-	-	-	-	5,000 00	1	-
Groton, . . .	3	47 51	535 07	582 58	1,735 29	2,150 40	187 60	300 00	754 94	1,054 94	1,768 95	1	-
Groveland, . . .	3	669 29	193 26	862 55	492 33	1,035 47	485 59	543 14	163 23	706 37	506 16	-	2
Halifax, . . .	3	521 69	12 91	534 60	262 17	923 33	436 09	661 16	22 76	683 92	269 24	-	-
Hamilton, . . .	3	400 00	843 01	1,243 01	2,080 78	2,242 93	976 48	-	774 01	774 01	2,466 01	1	2
Hanover, . . .	3	732 13	374 92	1,107 05	784 20	2,248 57	975 53	1,464 37	1,176 11	2,640 48	842 74	1	-
Hanson, . . .	3	559 73	57 32	617 05	580 61	967 84	628 81	337 23	276 76	663 99	593 40	1	-
Harvard, . . .	3	879 84	532 23	1,412 07	702 06	1,309 97	990 05	7 91	12,405 56	1,813 47	723 44	1	-
Harwich, . . .	3	-	-	-	627 67	-	-	-	-	-	669 28	-	1
Haverhill, . . .	1	-	24	24	5,000 00	5,695 40	2,041 97	-	-	-	5,000 00	-	-
Hingham, . . .	2	-	1,271 66	1,809 33	3,281 43	3,239 71	2,464 84	-	3 1,258 13	1,007 55	3,314 48	2	-
Holbrook, . . .	3	-	-	-	661 97	-	-	-	-	-	680 29	-	2
Holden, . . .	3	217 14	8 40	225 54	725 84	42,734 76	529 50	2,008 92	299 57	2,308 49	743 11	1	-
Holliston, . . .	3	-	-	-	807 10	-	-	-	58	58	813 98	-	-
Hopedale, . . .	3	-	-	-	2,388 25	-	-	-	-	-	2,682 36	-	-
Hopkinton, . . .	3	587 12	89 23	676 35	727 08	4,799 61	173 25	72 53	60 89	133 42	755 66	-	2
Hubbardston, . . .	3	150 33	-	150 33	315 47	538 53	234 65	-	-	-	302 89	-	-

¹ Received sprayer from State, town paying one-half the cost, \$600.² Town paid full cost of supplies.³ Town paid part of the amount for supplies.⁴ Work financed by State.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.		Required Expendi- ture.	Large.	Small.
Hudson, . . .	3	\$199 57	\$301 86	\$501 43	\$1,659 29	\$2,258 02	\$958 40	-	\$1,976 21	\$1,376 21	\$1,602 78	1	-
Hull, . . .	2	-	-	-	3,258 48	-	-	-	-	-	3,548 58	1	-
Ipswich, . . .	3	456 63	779 22	1,235 85	2,196 02	2,445 27	1,305 30	\$249 25	957 38	1,206 63	2,210 78	1	2
Kingston, . . .	3	1,311 43	361 94	1,703 37	671 96	1,804 70	534 98	1,132 74	294 73	1,427 47	672 99	1	-
Lakeville, . . .	3	-	-	-	464 75	-	-	-	-	-	513 60	-	-
Lancaster, . . .	2	-	-	-	2,744 58	-	-	-	-	-	2,765 93	1	-
Lawrence, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	2
Leicester, . . .	3	-	-	-	1,002 99	-	-	-	-	-	1,021 31	-	-
Lenox, . . .	2	-	-	-	3,585 22	-	-	-	-	-	3,645 75	-	-
Leominster, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-	-
Lexington, . . .	2	1,723 83	2,461 24	3,932 82	3,425 04	2 5,131 48	1,385 16	1,098 57	931 09	1,843 44	3,605 05	2	3
Leyden, . . .	3	-	-	-	-	-	-	-	-	-	91 19	-	-
Lincoln, . . .	3	-	13,727 66	3,127 66	1,751 04	2,072 52	1,656 41	162 48	1,700 38	1,862 86	1,604 02	3	-
Littleton, . . .	3	312 86	11,964 62	1,677 48	477 62	821 09	93 25	343 47	697 82	1,041 29	493 03	1	-
Lowell, . . .	1	-	-	-	5,000 00	5,848 40	4,598 60	-	386 58	193 29	5,000 00	2	-
Lunenburg, . . .	3	489 26	11,855 53	1,744 79	557 11	1,219 57	1,731 28	662 46	676 75	1,339 21	602 52	1	-
Lynn, . . .	1	-	-	-	5,000 00	3,712 52	-	-	-	-	5,000 00	2	2
Lynnfield, . . .	3	1,981 77	626 92	2,608 69	507 20	2,357 01	554 55	1,849 81	567 44	2,417 25	525 74	1	1

Malden,	1	-	-	5,000 00	-	-	-	-	5,000 00	1	3
Manchester,	1	-	-	5,000 00	-	-	-	-	5,000 00	-	-
Mansfield,	3	-	-	1,768 66	-	-	-	-	1,342 09	1	-
Marblehead,	2	-	-	3,764 06	-	-	-	-	4,444 38	1	1
Marion,	3	-	-	2,066 85	-	-	-	-	2,350 14	-	-
Marlborough,	2	141 49	854 12	4,289 75	2,265 13	-	-	1,629 03	4,402 46	2	-
Marshfield,	3	659 00	798 24	1,129 52	1,929 27	799 75	871 93	1,671 68	1,045 51	1	-
Mashpee,	3	1,328 06	286 74	100 03	878 03	47 00	253 03	1,031 03	106 40	-	-
Mattapoisett,	3	-	-	740 39	-	-	-	-	758 23	-	1
Maynard,	3	-	1,542 04	1,637 82	1,587 88	304 70	-	-	1,652 82	-	1
Medfield,	3	-	-	726 81	-	-	-	-	1,022 12	-	1
Medford,	1	-	1,040 94	5,000 00	4,019 88	-	640 40	-	5,000 00	-	-
Medway,	3	-	-	688 73	-	-	-	-	716 36	-	1
Melrose,	1	-	-	5,000 00	-	-	-	-	5,000 00	2	1
Mendon,	3	-	-	277 51	-	-	-	-	287 03	-	-
Merrimac,	3	776 80	215 10	513 78	1,465 74	368 63	216 59	1,168 55	537 47	-	2
Methuen,	2	159 77	907 65	3,360 68	3,726 52	2,426 59	65 66	973 70	3,754 86	3	2
Middleborough,	3	770 00	681 09	1,993 88	2,799 43	1,329 90	805 55	1,642 02	1,986 31	1	-
Middleton,	3	1,048 93	301 09	364 61	1,204 97	216 56	840 36	1,067 19	371 73	-	2
Milford,	2	-	-	4,029 46	-	-	-	-	4,061 36	-	-
Millbury,	3	-	-	1,186 66	-	-	-	-	1,285 32	-	-

³ Town paid part of the amount for supplies.⁴ Town paid full cost of supplies.¹ Received sprayer from State, town paying one-half the cost, \$600.² Work financed by State for month of December.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.		Required Expendi- ture.	Large.	Small.
Millis, . . .	3	-	-	-	\$547 23	-	-	-	-	-	\$558 17	1	-
Milton, . . .	1	-	\$4,302 76	\$1,911 61	5,000 00	\$1,092 13	-	-	2 \$18 50	-	5,000 00	3	-
Nahant, . . .	2	-	-	-	3,627 12	-	-	-	-	-	3,474 48	-	1
Nantucket, . .	3	-	-	-	1,736 82	-	-	-	40	\$0 40	1,836 92	-	-
Natick, . . .	2	-	2 87 80	-	3,536 28	3,419 96	\$2,408 82	-	2 92 15	-	3,647 16	3	-
Needham, . . .	2	\$355 99	-	355 99	3,110 46	-	-	-	-	-	3,365 53	1	-
New Bedford, .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-	-
New Braintree, .	3	-	-	-	169 27	-	-	-	-	-	164 95	-	-
New Salem, . .	3	-	-	-	157 03	-	-	-	-	-	162 70	-	-
Newbury, . . .	3	1,370 11	581 79	1,951 90	604 09	1,653 14	785 28	\$1,049 05	531 58	1,580 63	635 69	1	2
Newburyport, . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	1
Newton, . . .	1	2,000 00	9,849 28	6,924 64	5,000 00	12,986 61	19,684 39	1,598 54	4,789 55	3,993 31	5,000 00	7	-
Norfolk, . . .	3	130 71	111 58	242 29	479 03	825 93	189 45	346 90	111 96	458 86	465 54	-	1
North Andover, .	3	98 10	538 20	636 30	2,229 00	2,093 66	1,374 16	-	1 775 57	640 23	2,301 33	1	2
North Attleborough,	2	-	-	-	3,828 41	-	-	-	-	-	3,876 10	1	-
North Brookfield, .	3	-	-	-	765 03	-	-	-	-	-	800 17	-	-
North Reading, .	3	2,278 38	1,344 45	3,622 83	367 70	1,953 37	981 59	1,585 67	1,017 92	2,603 59	393 09	1	-
Northborough, . .	3	78 37	3 1,492 33	970 70	738 19	1,542 54	244 35	904 35	448 73	1,353 08	770 71	1	-

Northbridge, . . .	3	-	-	2,210 49	-	-	-	-	2,232 67	-	-	1
Norton, . . .	3	-	-	675 10	-	4 86 00	-	-	666 60	-	-	1
Norwell, . . .	3	588 73	1,021 27	1,610 00	462 94	867 84	1,000 69	404 90	1,636 43	1,231 53	475 65	1
Norwood, . . .	1-2	-	-	5,000 00	-	-	-	-	4,449 52	-	1	-
Oak Bluffs, . . .	3	-	-	765 61	-	-	-	-	779 00	-	-	-
Oakham, . . .	3	-	-	151 92	-	-	-	-	147 11	-	-	-
Orange, . . .	3	-	-	1,622 09	-	-	-	-	1,605 70	-	-	-
Orleans, . . .	3	-	-	1,478 52	-	-	-	-	1,534 24	-	-	-
Oxford, . . .	3	-	-	825 79	-	-	-	-	836 65	-	-	-
Palmer, . . .	3	-	-	2,115 60	-	-	-	-	2,103 39	-	-	-
Paxton, . . .	3	-	-	158 87	-	-	-	-	163 18	-	-	-
Peabody, . . .	1	-	-	5,000 00	-	-	-	-	5,000 00	1	1	-
Pembroke, . . .	3	1,455 97	63 00	1,519 57	434 81	1,687 18	446 75	652 37	1,972 54	1,920 17	406 61	1
Pepperell, . . .	3	1,004 74	422 93	1,427 67	926 75	1,864 28	527 12	937 53	1,509 32	571 79	943 42	1
Petersham, . . .	3	-	-	444 69	-	-	-	-	460 97	-	-	-
Phillipston, . . .	3	-	-	116 14	-	-	-	-	124 70	-	-	-
Plainville, . . .	3	-	-	414 68	-	790 77	59 22	200 00	350 97	150 97	417 16	1
Plymouth, . . .	1	-	-	5,000 00	-	-	-	-	5,000 00	-	2	-
Plympton, . . .	3	1,503 90	134 08	1,637 98	174 25	1,963 84	108 12	1,789 59	2,073 93	284 34	182 82	1
Princeton, . . .	3	-	1 80	596 48	4 7,511 84	691 86	6,915 36	682 96	7,598 32	594 05	-	-
Provincetown, . . .	3	-	-	944 17	-	-	-	-	969 35	-	-	-

¹ Town paid part of the amount for supplies.² Town paid full cost of supplies.³ Received sprayer from State, town paying one-half the cost, \$600.⁴ Work financed by State.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.		
Quincy, . . .	1	-	¹ \$1,146 64	\$904 77	\$5,000 00	\$966 33	-	² \$1,133 92	-	\$5,000 00	2	-		
Randolph, . . .	3	-	-	-	1,129 50	-	-	-	-	1,153 50	-	1		
Raynham, . . .	3	-	¹ 61 23	23 81	365 10	130 77	\$122 63	47 45	\$170 08	313 30	-	1		
Reading, . . .	2	\$133 33	1,464 88	1,305 23	2,788 71	2,201 25	32 28	1,850 11	1,512 37	3,007 58	2	1		
Rehoboth, . . .	3	-	-	-	411 04	-	-	-	-	328 34	-	1		
Revere, . . .	1	-	-	-	5,000 00	-	-	-	-	5,000 00	1	1		
Rochester, . . .	3	-	² 29 35	-	383 62	-	-	-	-	415 98	-	1		
Rockland, . . .	3	-	-	-	2,091 52	-	-	-	-	2,171 19	-	1		
Rockport, . . .	3	313 72	-	313 72	1,563 59	1,135 91	-	-	-	1,609 42	1	3		
Rowley, . . .	3	220 07	246 50	466 57	919 07	890 46	-	¹ 608 57	285 66	869 73	1	1		
Royalston, . . .	3	-	² 3 90	-	288 25	193 10	-	-	-	299 39	-	-		
Rutland, . . .	3	-	-	-	342 78	-	-	-	-	366 93	-	-		
Salem, . . .	1	-	-	-	5,000 00	-	-	-	-	5,000 00	1	1		
Salisbury, . . .	3	898 91	304 22	1,203 13	571 86	480 47	207 36	⁴ 1,874 54	1,481 90	590 16	1	2		
Sandwich, . . .	3	295 81	139 99	435 80	520 32	90 50	219 62	156 93	376 55	570 50	-	-		
Saugus, . . .	2	1,798 32	763 79	2,462 11	3,991 11	2,224 13	851 16	¹ 1,027 34	1,673 03	2,777 34	2	1		

Scituate,	3	3,045 05	¹ 4,511 70	6,356 75	2,218 48	4,967 58	1,500 00	2,749 10	1,003 61	3,812 71	2,279 01	2
Seekonk,	3	-	-	-	659 45	-	-	-	-	-	637 08	-
Sharon,	3	-	-	-	1,487 41	-	-	-	-	-	1,484 78	-
Sherborn,	3	147 88	333 19	481 07	892 70	830 60	1,087 00	-	1,326 74	264 64	957 37	1
Shirley,	3	40 83	313 83	354 66	505 28	665 34	141 90	160 06	405 15	565 21	524 04	1
Shrewsbury,	3	-	² 38 81	-	1,001 17	1,048 80	493 59	-	38 61	38 61	1,090 37	1
Somerset,	3	-	-	-	659 68	-	-	-	-	-	615 49	-
Somerville,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-
Southborough,	3	-	⁴ 1,459 70	859 70	856 04	1,264 13	849 23	348 94	238 46	587 40	926 47	2
Spencer,	3	-	-	-	1,408 47	-	-	-	-	-	1,457 87	-
Springfield,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	-
Sterling,	3	-	1 336 75	331 17	499 84	1,425 67	243 26	846 24	426 59	1,272 83	508 38	1
Stockbridge,	3	-	-	-	1,703 57	-	-	-	-	-	1,991 67	-
Stonham,	3	-	¹ 688 48	641 36	2,140 83	2,315 11	1,586 78	69 99	675 69	746 68	2,362 14	1
Stoughton,	3	-	-	-	1,610 80	1,721 22	853 00	110 42	866 06	976 48	1,666 30	1
Stow,	3	779 85	403 49	1,183 24	448 54	1,483 34	386 24	200 00	⁴ 2,248 60	1,848 60	462 68	1
Sturbridge,	3	-	-	-	372 80	-	-	-	-	-	376 69	-
Sudbury,	3	1,178 21	455 90	1,634 11	558 91	1,939 18	516 21	956 77	746 22	1,702 99	599 43	1
Sutton,	3	-	-	-	611 92	-	-	-	-	-	583 98	-
Swampscott,	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1

¹ Town paid part of the amount for supplies.² Town paid full cost of supplies.³ Work financed by State.⁴ Received sprayer from State, town paying one-half the cost, \$600.⁵ Received two sprayers from State, town paying one-half the cost, \$1,200.

CITIES AND TOWNS.	Class.	1913.			1914.						1915.		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.		Large.	Small.
Swansea, . . .	3	-	-	-	\$706 68	-	-	-	-	-	\$499 77	-	-	1
Taunton, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	-	-
Templeton, . . .	3	-	\$1 69	\$1 69	734 77	\$2,117 90	\$745 70	\$1,383 13	\$243 73	\$1,626 86	789 90	-	-	-
Tewksbury, . . .	3	\$799 98	598 20	1,398 18	645 83	1,797 53	342 81	1,151 70	1,018 45	2,170 15	676 85	1	1	1
Topsfield, . . .	3	337 55	194 85	532 40	1,427 43	¹ 1,340 03	668 14	-	294 91	² 207 51	1,628 20	-	-	1
Townsend, . . .	3	1,128 69	286 69	1,415 38	546 91	1,148 77	552 80	601 86	552 84	1,154 70	567 99	1	-	-
Truro, . . .	3	-	-	-	163 22	-	-	-	-	-	169 23	-	-	-
Tyngsborough, . . .	3	737 49	³ 2,228 41	2,365 90	269 96	1,880 29	728 73	1,610 33	1,021 85	2,632 18	283 11	-	-	-
Upton, . . .	3	-	-	-	504 47	-	-	-	-	-	507 46	-	-	-
Uxbridge, . . .	3	-	-	-	1,503 98	-	-	-	-	-	1,608 55	-	-	-
Wakefield, . . .	2	-	⁴ 829 68	-	4,602 40	-	-	-	827 18	-	4,766 51	2	1	1
Walpole, . . .	3	-	-	-	2,762 19	-	-	-	-	-	2,864 54	1	-	-
Waltham, . . .	1	259 23	1,779 41	1,148 93	5,000 00	7,817 54	5,539 54	681 62	1,454 80	1,408 77	5,000 00	2	1	1
Wareham, . . .	3	-	-	-	2,218 48	-	-	-	-	-	1,918 00	1	-	-
Warren, . . .	3	-	-	-	979 44	-	-	-	-	-	1,024 81	-	-	-
Warwick, . . .	3	-	-	-	182 51	-	-	-	-	-	187 68	-	-	-

Watertown, . . .	1	-	-	5,000 00	-	-	-	-	5,000 00	1	-
Wayland, . . .	3	243 33	766 15	1,009 48	-	-	265 44	922 70	1,188 14	1	-
Webster, . . .	2	-	-	2,851 88	-	-	-	-	3,376 96	-	-
Wellesley, . . .	1	-	4 3 50	5,000 00	-	5,467 12	1,588 76	-	5,000 00	3	-
Wellfleet, . . .	3	-	-	352 84	-	-	-	-	336 92	-	1
Wendell, . . .	3	-	-	-	-	-	-	-	205 15	-	-
Wenham, . . .	3	-	1,589 19	989 19	-	1,605 88	600 95	571 71	1,321 30	1	1
West Boylston, . . .	3	-	-	-	-	366 25	270 07	77	397 72	-	-
West Bridgewater, . . .	3	567 85	277 02	844 87	-	1,463 88	631 63	366 55	656 02	1	-
West Newbury, . . .	3	952 20	318 45	1,270 65	-	986 27	464 96	215 42	430 32	1	2
Westborough, . . .	3	-	1,850 17	1,250 17	-	1,686 99	466 48	138 61	1,333 45	1	-
Westford, . . .	3	983 55	1,045 41	2,028 96	-	1,498 03	776 75	912 82	902 64	1	1
Westminster, . . .	3	610 09	102 56	712 65	-	2,367 41	218 60	130 62	390 89	-	1
Weston, . . .	2	982 80	3,700 90	3,583 52	-	5,805 99	1,920 30	1,539 63	3,516 77	5	-
Westport, . . .	3	-	-	-	-	-	-	-	813 32	-	-
Westwood, . . .	3	-	-	-	-	-	-	-	1,788 42	1	-
Weymouth, . . .	2	-	2,360 53	1,774 63	-	3,982 14	1,667 25	2 1,873 06	4,808 27	2	-
Whately, . . .	3	-	-	-	-	-	-	5 26	291 84	-	-
Whitman, . . .	3	-	-	-	-	-	-	-	2,256 00	1	-
Wilbraham, . . .	3	-	-	-	-	-	-	-	566 35	-	-
Wilmington, . . .	3	1,686 44	2,586 52	3,672 96	-	2,023 46	1,315 74	812 67	792 29	1	1

¹ Work financed by State.

² Town paid part of the amount for supplies.

³ Received sprayer from State, town paying one-half the cost, \$600.

⁴ Town paid full cost of supplies.

CITIES AND TOWNS.	Class.	1913.			1914.					1915.		SPRAYING OUTFITS IN TOWNS AND CITIES.	
		Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Winchendon, . . .	3	\$147 82	\$179 17	\$326 99	\$1,720 71	\$2,023 28	\$750 44	\$902 57	\$325 73	\$1,228 30	\$1,737 45	1	-
Winchester, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	1	1
Winthrop, . . .	1	-	-	-	5,000 00	-	-	-	-	-	5,000 00	2	-
Woburn, . . .	2	3,628 61	1,418 76	4,763 02	4,828 12	8,515 98	1,344 69	2,776 85	867 21	3,470 62	4,933 61	1	1
Worcester, . . .	1	-	-	-	5,000 00	10,195 53	13,547 13	-	1,230,024 06	1,512 03	5,000 00	3	-
Wrentham, . . .	3	-	-	-	587 68	-	-	-	-	-	620 34	-	1
Yarmouth, . . .	3	-	-	-	1,020 00	-	-	-	-	-	1,048 39	-	-

¹ Received sprayer from State, town paying one-half the cost, \$600.

² Town paid part of the amount for supplies.

CONCLUSION.

Each year heretofore the annual report of the State Forester has concluded with the following heading: "Summary of Recommendations." This is omitted this year, as we are not asking for any new legislation other than is covered in the general estimates that have been sent to the State Auditor.

I am pleased to say that with the legislation of the last General Court, the general program outlined by this department for securing the fundamentals of a State forest policy, which has extended over a period of eight years, has been covered.

We are, therefore, now in a position to exert our best energies in accomplishing results. Let us all have a part in this splendid work.

Respectfully submitted,

F. W. RANE,
State Forester.

